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Probably many of those in attendance at the convention on Wednesday are not familiar with the provisions of the so-called "ash-pan" law to which Secretary Moseley alluded in his address. The measure was passed by Congress late in the session and was so little discussed that most railroad men never heard of it until after its enactment. The first section provides that "on and after the first day of January, 1910, it shall be unlawful for any common carrier engaged in interstate or foreign commerce by railroad to use any locomotive in moving interstate or foreign traffic, not equipped with an ash pan, which can be dumped or emptied and cleaned without the necessity of any employe going under such locomotive." The second section makes the foregoing provision applicable in the District of Columbia. The third fixes a penalty of $200 for each violation, to be recovered by suit to be brought by the United States district attorney in whose district the offense is committed, and makes it the duty of the district attorneys to prosecute for such offenses and of the interstate commerce commission to furnish to the district attorneys information of them. The sixth and last section provides that the act shall not apply to any locomotive upon which, by reason of the use of oil, electricity, or any other such agency, an ash pan is not necessary. The difficulties that will be encountered in winter by railroads operating in the North in complying with the statute are obvious. It is hoped that, for the relief of the Northern lines, Congress can be induced to pass a supplementary act repealing the law of physics in obedience to which water freezes at 32 degrees F.

There was illustrated Wednesday in the convention a feature of the work of the Master Car Builders' Association which has appeared before and has been responsible not only for the waste of much valuable time but indirectly for the introduction into the standards and recommended practice of practices that ought never to have become standard and of recommendations that ought never to have seen the light. This has reference to the method of handling the work on "Standards and Recommended Practice." Under the present method of procedure a vast number of recommendations are brought before the convention that ought never to have been allowed to leave the committee room. In fact, many of them have no reason for entering the hands of the committee except the opinion of one man who has perhaps jumped at a conclusion. On no other committee is there opportunity for so much thoughtful, pains-taking work. The standards of the M. C. B. association have in the past attained such dignity that no safeguard is too great to be thrown around them as a protection. To preserve this dignity they must be treated as in a sense sacred. Such suggestions as are made should be thoroughly thrashed out in committee and only those of unquestionable worth be brought before the convention. As the matter stands now, the only measure of relief from an almost endless waste of time is a motion to refer to letter ballot, which seldom attains fully the object for which it was intended—that is, to obtain the result of a careful consideration of the subject on the part of each member. Little time is available before a reply to the letter ballot is required and possibly during that time the member is busy but is obliged to vote yes or no on a number of questions. If there were only a few, he could vote intelligently on all. Apparently now, he jumps at conclusions on some with the result that a part of the work of every year is in undoing the work of previous years. By all means let the committee get out its blue pencil and cut out the foolish or unsupported recommendations.

The efficiency of labor in the railroad shops that have been kept open has increased materially since last fall. This is both because the less competent workmen have been weeded out and because those who have been kept have for obvious reasons become more painstaking and energetic. The problem of maintaining high average efficiency after good times return is one to the solution of which officers over large bodies of men cannot too soon devote earnest thought. The high ratio of operating expenses in the early part of last year was largely due not only to the unprecedented wages paid, but also to the fact that the amount and quality of the work done in return for the high wages were generally not equal to the amount and quality of that formerly done for less pay. Better efficiency methods must be worked out and adopted; and it is of importance that in working out these methods the human element should be taken into account. The results secured in every shop, as well as on every division, depend to a great extent not only upon the brain, but upon the personality of the man at the head. The labor unions have succeeded in alienating the loyalty of many employees from the railroads. For the roads to recover the loyalty of their employees is of vital importance. Loyalty, however, is chiefly a personal matter. The man who is loyal to a road is usually loyal to it through its officers whom he respects and admires, and whom he believes take a real interest in his welfare. Therefore, so far as greater efficiency is to be secured through increased loyalty, it must be gained by officers keeping in close, friendly touch not merely with their immediate subordinates, but with the men throughout their jurisdictions. The men must also be made not only to feel that the officers take a personal interest in their good, but to realize fully that their economic welfare is indissolubly bound up with that of the roads—that the earnings of the roads depend to a great extent upon the excellence of the work done by their employees, and that therefore the highest wages can be paid permanently only for the best work. The master car builder and

the master mechanic can render no better service to their roads than by striving constantly to build up in their departments an esprit de corps that will be invulnerable against the attacks of the demagogue and the walking delegate.

TESTS OF FRICTION DRAFT GEAR.

Since the introduction of automatic couplers, little care has been taken in handling trains and there is general complaint that rough usage is especially severe in gravity yards where hand brakes are not used effectively. It is true, however, that the gravity yards do away with a great deal of tugging, buffing and racking, which perhaps injure the draft rigging more than the single blow it gets from the gravity run. The damage to cars in yards has become so great that the Pennsylvania Railroad has issued orders that the speed in switching should not exceed two miles per hour.

It is the general opinion that the pulling stress of the engine on draft gear is equal to a pressure of 150,000 to 180,000 pounds, and the effect of buffing as measured by the dynamometer car may be taken as equal to a pressure of 500,000 pounds maximum under ordinary conditions.

The kinetic energy of a 50-ton car loaded to capacity, making a total weight of 150,000 pounds, at a speed of 2 miles per hour is nearly 20,000 foot-pounds; at 4 miles per hour nearly 79,500 foot-pounds; at 5 miles per hour, 124,275 foot-pounds; at 8 miles per hour, 318,000 foot-pounds; at 10 miles per hour, 497,000 foot-pounds; and at 20 miles per hour, nearly 2,000,000 foot-pounds. This is calculated by the formula $E = \frac{1}{2} Wv^2 \div g$ where W is the weight in pounds, v the speed in feet per second and g the force of gravity, 32.16. The force developed in stopping this moving mass and converting the energy into work, which is the function of the draft gear, will depend entirely upon the nature of the resistance with which the moving mass is opposed, and hence the need for service tests as opposed to static tests, and at the same time the difficulty in finding a satisfactory specification for the service test.

Three methods have been employed in testing friction draft gears, but none of them has proved to be entirely satisfactory and the subject is still in such condition that no specification for draft gear has been developed which could be used as an M. C. B. standard or as recommended practice. In view of the large number of friction draft gears which are now in use and which will be purchased in the future, it is important that additional experiments be made by the Master Car Builders' Association so that a satisfactory specification for them may be prepared.

Tests with the dynamometer car will give much information, but care must be exercised in interpreting results or they will be misleading. With a car equipped with one of the best draft gears running at 8 miles per hour striking an unyielding resistance, only 5.8 per cent of the whole energy would be transformed into work by the draft gear, leaving 94.2 per cent for the car to take care of directly. If the the car is stiff the final pressure developed will be very high. But if the car is yielding the force will be comparatively low, even if the car be equipped with low capacity draft gears.

An inspection of the static diagrams obtained from various draft gears shows that the provisions for resisting these blows are quite varied. While the ideal draft gear should show an initial resistance of 8,000 to 10,000 pounds during the first ½ inch of motion and should then gradually and uniformly increase up to a maximum, this requirement is rarely attained in any of the draft gears. The diagrams show a great fluctuation in the increasing pressure for equal travels and these irregularities occur at entirely different points of the stroke. In one gear there is a sudden jump of over 65,000 pounds in closing from 0.2 to 0.4 inch, and then the motion stops abruptly until a pressure of 72,000 pounds is reached. In another gear a similar sudden increase is shown a little later in the stroke while in still another the increase in pressure is rapid in the latter part of the stroke. Such fluctuations mean an uneven transmission of the buffing energy to the car. In fact, it means a small shock preceding the final shock instead of a continuously and uniformly increasing force. These draft gears should be improved and specifications should require that the fluctuation in pressure after the initial and working resistance is overcome corresponds to a straight compression line.

It has recently been shown under drop tests that several friction gears which made fairly good diagrams when subjected to a gradually applied load would not act efficiently under a sudden blow, though this is precisely the function for which they are intended. The tests reveal the fact that under a static test most of the friction draft gears act through their whole range of 2 to 2¼ inches, and thus develop their full capacity as expressed in pounds pressure. Under the drop tests, however, some of them shear the rivets of the draft lugs under four or five blows of a weight of 9,000 pounds dropped from a height of 6 inches, while others required it to be dropped from 12 inches and others, 18 inches, indicating that under a sudden blow some gears are rigid after the first ½ inch or so of travel under frictional resistance, while in the most efficient gear there is action through the whole range of its capacity. This revelation is of great importance to railroads, as it suggests a method of testing which will show the actual value of the friction draft gear in cushioning blows similar to those to which they are subjected in service. To obtain results which will be comparable, however, the tests should be all under blows of the same height of drop, or by a single blow for each gear, the blows being so graduated by preliminary experiment that the single blow on each gear is just sufficient for destruction.

One requirement of the friction draft gear which has been overlooked in some designs, is that when the gear closes all the yielding and minor parts should be out of action and the blow then should be transmitted through a solid casting to the car just the same as if there were no draft gear present. This could be accomplished by the use of rigid buffers backed up by oak blocks which would come into contact just before the friction gear is exhausted. The failure to comply with this requirement in the attachment of friction gears has given much trouble in service and some gears have had to be removed as fast as cars come to shop.

In the matter of repairs to draft gears it is rather important that standard material should be used where possible in designing important details. For example, the spring steel should not be different from the ordinary open-hearth steel used for making other railroad springs, as it costs more and the chances of getting different qualities of steel are greater, and it might be well for the Master Car Builders' Association to adopt a few standard springs to be used especially in friction draft gears.

It is important also that the association should be taking measures to obtain the data necessary for the preparation of a complete specification for friction draft gear. The Westinghouse Air Brake Company has already constructed an apparatus for testing draft gears under a drop, experimentation on which cannot fail to result in increasing greatly the available information on this subject, and inasmuch as there have been some adverse criticisms of the work already done with this apparatus on the score that the experiments were conducted at the plant, and therefore possibly under the influence, of a manufacturer, the Westinghouse company has signified its willingness to donate the use of this machine to the Master Car Builders' Association, and if desired will consent to its transfer to the laboratory at Purdue University or other similar institution.

One advantage of a good friction draft gear which has not been claimed by the manufacturers is its effect on train resistance in starting, as it has been shown that the recoil effect of draft springs reduces the capacity of a locomotive to

start a heavy train on grades and that where friction draft gears are used the capacity of the locomotive is increased. The records taken from dynamometer cars also show that the stresses throughout the train are much less with friction gear than with spring gear. It has been shown further that on account of the care required to prevent excessive shocks and break-in-twos in starting trains with spring gears much time is consumed in getting under way, while with the friction gear the steady and gradual pull of the locomotive enables it to move the train with promptness. These are operating advantages of considerable value and should be properly credited in addition to the large saving in car repairs which is due to the friction buffer.

MECHANICAL STANDARDS AND RAILROAD REGULATION.

The speech of Secretary Moseley, yesterday calls attention to the need for close coöperation between railroad executive and mechanical officers and railroad regulating authorities, especially the interstate commerce commission. Mr. Moseley expressed the view that railroad legislation will grow rather more than less drastic. It is to be hoped that time will prove that he is mistaken.

Increased restriction of the freedom of railroad officers in initiating and carrying out policies for the improvement of methods of railroad operation is not likely to inure to the good of either the railroads or the public. But if under pressure of public sentiment federal regulatory legislation shall grow more comprehensive and pervasive, the interstate commerce commission will have great influence in shaping it. Therefore, no effort should be spared to bring about the best and most intelligent understanding possible between railroad officers and the members, officials and representatives of the commission regarding transportation conditions and needs.

Mr. Moseley dwelt wisely upon the need, as a means to reducing the number of accidents, of the development and general adoption of mechanical standards. To the extent that such standards are developed, and adopted in practice, by the railroads of the country, to that extent the need, and perhaps the popular demand, for legislation for the protection of shipments, employes and travelers will be reduced. If in spite of a manifestation by the railroad companies of a disposition to do everything that they can to reduce the dangers of railroad work and travel, the demand for further restrictive legislation continues to be made, the development by the roads themselves of proper standards to be incorporated into law will tend to make the legislation enacted cause the minimum of harm and the maximum of good. The interstate commerce commission and the intelligent portion of the public recognize the fact that the mechanical experts of the railroads are better equipped and better situated to determine what safety appliances are practicable and are needed than any other class of persons; and the standards and equipment that they favor will be given the sanction and force of law if it be made clear that their recommendations are in the interest of the public as well as of the railroads. One of the main reasons why there heretofore has been so much unwise railroad legislation —a shining example being the passage by congress at its recent session of the ash-pan law referred to by Mr. Moseley —is that railroad men have not always used diplomacy, energy and judgment in trying to shape such legislation. If Congress and the state legislatures, when the railroad regulating mood is upon them, do not have wise measures presented to them, experience shows that they are pretty certain to pass unwise measures; and the decision of the Supreme Court of the United States in the Taylor case, to which Mr. Moseley referred, shows that the courts will uphold statutes of congress that are very arbitrary in their provisions if they be not plainly unreasonable and confiscatory. This emphasizes the fact that when standards are once adopted by competent associations of railroad officers they ought to be followed.

APPRENTICESHIP SYSTEM COMMITTEE EXHIBIT.

Notwithstanding the fact that booth 67 is small, a very extensive and interesting exhibit has been placed there. C. W. Cross, chairman of the committee on the apprenticeship system, assisted by W. B. Russel, are in attendance in interest of the exhibit. These gentlemen are respectively supervisor and assistant supervisor of apprentices on the New York Central Lines. They are intensely enthusiastic about the entire question and the exhibit is proof of the fact that they have instilled their enthusiasm into motive power departments generally. The following 11 railroads are represented: Central of New Jersey, Grand Trunk, Atchison Topeka & Santa Fe, New York Central & Hudson River, Union Pacific, Erie, St. Louis & San Francisco, Canadian Pacific, Pennsylvania Railroad, Delaware & Hudson and Southern Pacific.

In its leaflet mentioning the exhibit, attention is directed to the simple and inexpensive character of the school outfits. Drawing tables and boards are made in the company's shops and the various parts of locomotives and cars used in demonstration are taken from the scrap pile. The method of teaching, specially devised to meet the needs of apprentices, is a direct, hand-to-hand type, using the various problems with which the boys come into contact daily. In a large number of instances the time spent in school work is included on the pay rolls, and there is a growing tendency in this direction. Better results are obtained from the day than from the night schools.

The exhibit sent in by the Central of New Jersey includes a number of drawings, wooden models for instruction, photographs of the class rooms, a chart showing apprentice shop assignments, etc.

The exhibit of the Grand Trunk shows a number of photographs, drawings, etc. This system has a regular form of examination for passing an apprentice from one machine to another. A copy of this form, filled in, is shown. The apprentice camera club of the Fort Gratiot shops of the Grand Trunk is a departure in apprentice courses.

The exhibit of the Atchison Topeka & Santa Fe is not representative of the extensive work which is being done on this line. The Santa Fe is probably ahead in this movement. Instructors are listed on the pay rolls as such, and the apprentice instruction is their chief rather than secondary work.

The New York Central exhibit contains a large working model of the Walschaerts valve motion, for use in apprentice instruction; a large number of models for drawing classes and also several photographs of both shop and class room work. The school at Brightwood is held in a separate building especially built for the purpose. The apprentice attends school from 7 a.m. to 9 a.m., two, and occasionally three, times per week. The drawing table and outfit of this road is shown in the exhibit.

The Union Pacific and Southern Pacific exhibits are confined mostly to photographs of their classes and drawings made in the courses. A model cylinder saddle casting pattern, made by apprentices, is shown.

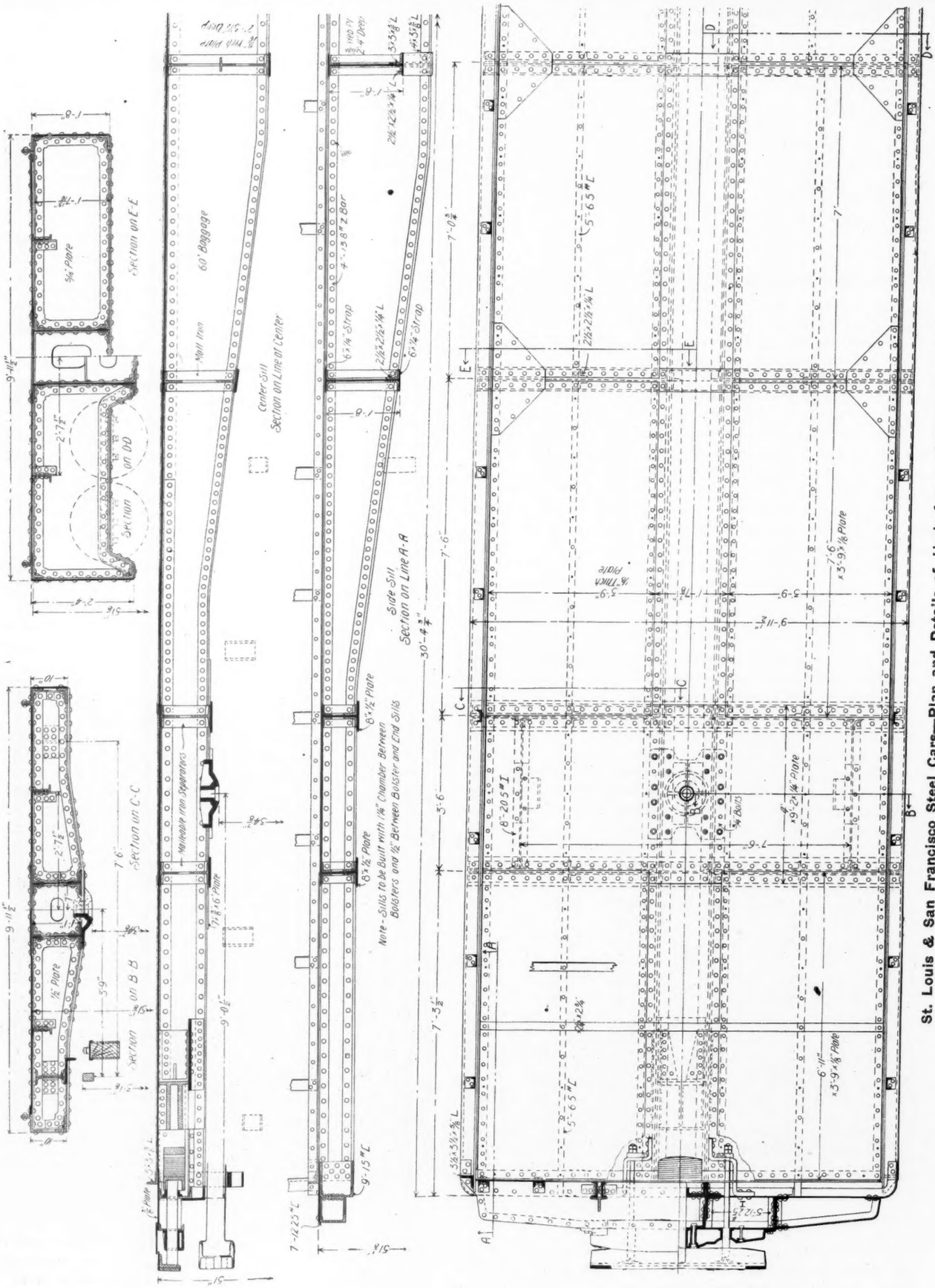
The Erie sent for the exhibit outlines of the courses, including rules and record sheets. The Erie system was modeled upon that of the New York Central.

The St. Louis & San Francisco show drawings, photographs and a letter describing progress from L. Robinson, instructor.

Canadian Pacific sent in some copies of examination papers. The apprentice instruction scheme may be said to be in its infancy on the Canadian Pacific. Plans are well under way, however, and will be pushed through.

The Pennsylvania Railroad sent a series of photographs of the Altoona Technical High School, a city institution into which the railroad placed the necessary equipment and instructors from the shops.

The Delaware & Hudson have a number of photographs of apprentices at work both in school and the shop, also copies of the general reports, entrance qualifications, etc.

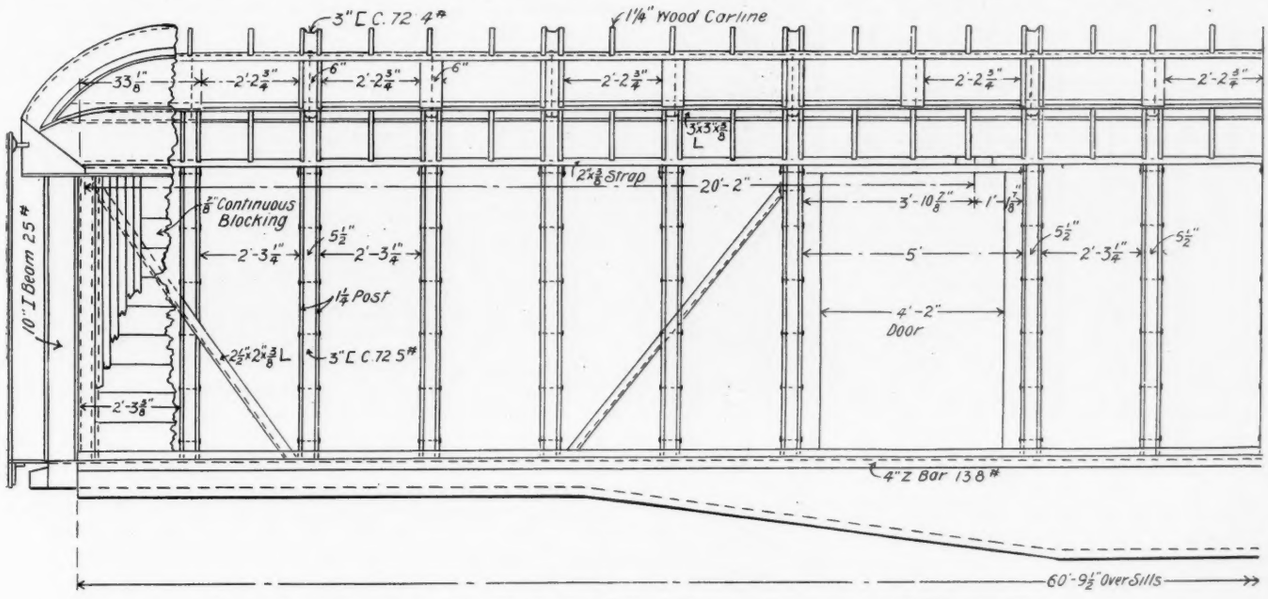


St. Louis & San Francisco Steel Cars—Plan and Details of Underframe of Baggage and Express Car.

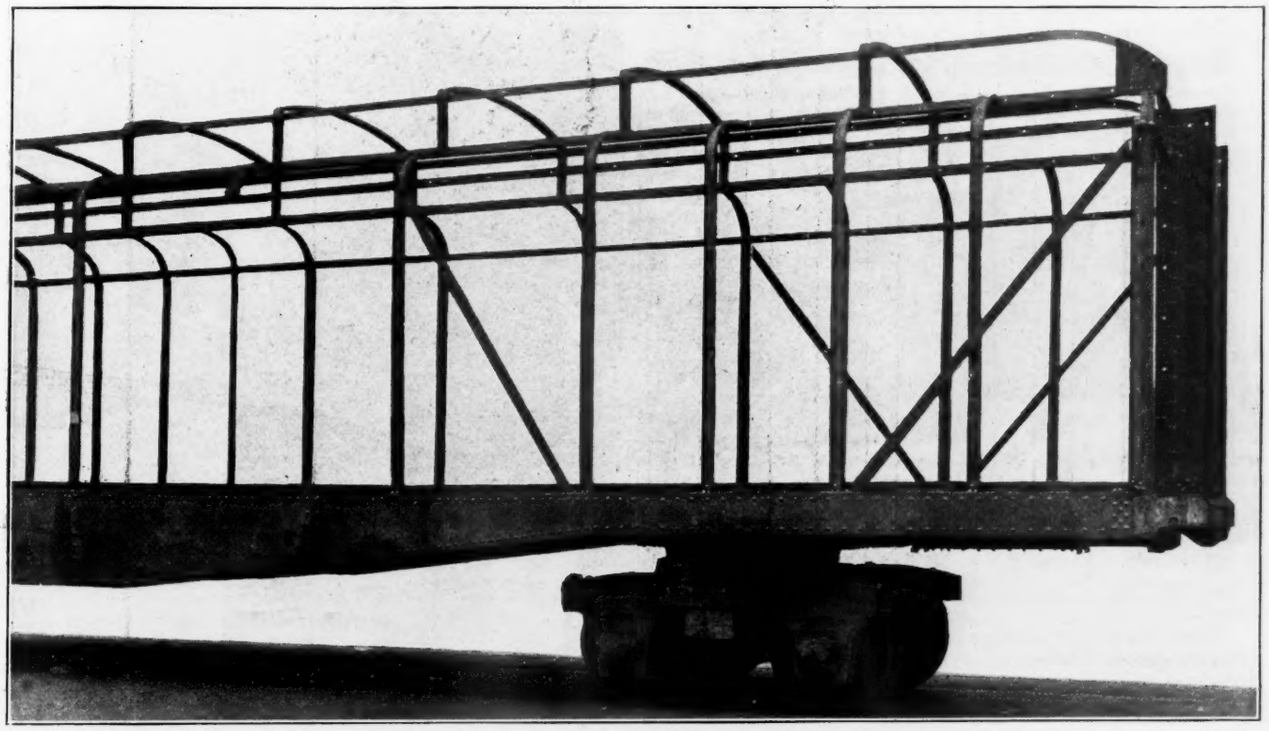
STEEL MAIL AND BAGGAGE CARS FOR THE ST. LOUIS & SAN FRANCISCO.

Early in April the Pullman Company completed 25 baggage and express cars and six baggage and mail cars for the Saint Louis & San Francisco, all of them having steel underframes and steel upperframes covered with wooden siding. The baggage cars are 60 feet 8½ inches over end sills and the mail cars 70 feet 1 inch over end sills. The width of the car over side sills is 9 feet 11½ inches. The construction of the two kinds of cars is similar in many respects, with the exception of necessary changes for additional length, and the detailed illustrations shown are of the baggage and express car.

The cars are intended for heavy loads and the sills are unusually deep at the center. The cross section shows a maximum depth of 28 inches. The center sill is made up of a 5-16-inch web plate with 4 by 3 by 5-8-inch angles at top and bottom, while the side sills have extra heavy angles at the bottom and 4-inch 13.8-pound Z-bars at the top. These sills are connected between bolsters by diaphragms made of 5-16-inch plates and heavy angles.



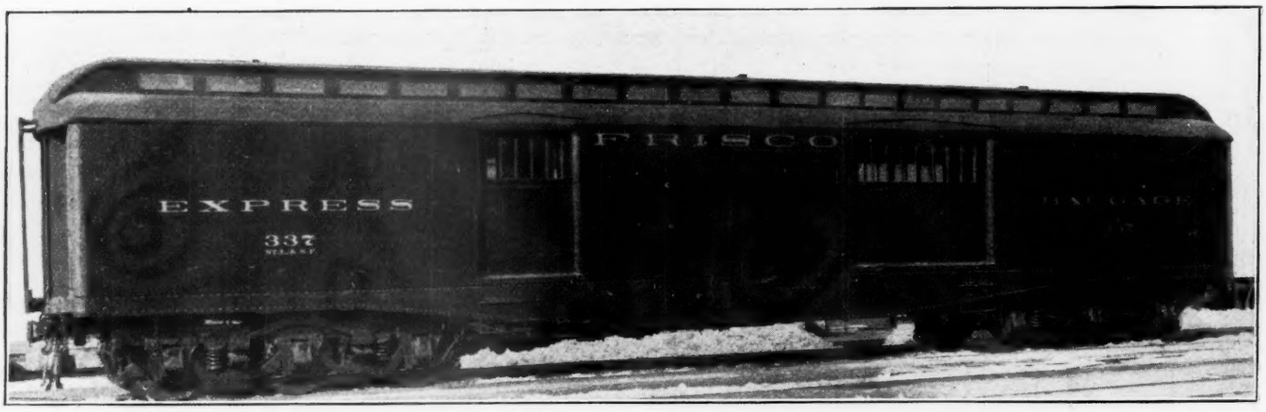
St. Louis & San Francisco Steel Cars—Steel Frame of Baggage and Express Car.



St. Louis & San Francisco Steel Cars—Side Elevation of Frame of Baggage and Express Car.

The body bolsters are built up of ½-inch web plates and heavy angles, and at the bottom of each there is a rolled plate ½ by 8 inches. These bolsters are separated by malleable iron castings which support the center plate. The depth of the sills at bolsters is 10 inches. The end posts at

the center door are of 10-inch I-beams, 25 pounds per foot. The draft rigging is arranged with the Forsyth friction buffer plates and the end sills buffer beams and casings for this buffer are cast steel furnished by the Commonwealth Steel Company. The upper frame has 3-inch channel posts, and

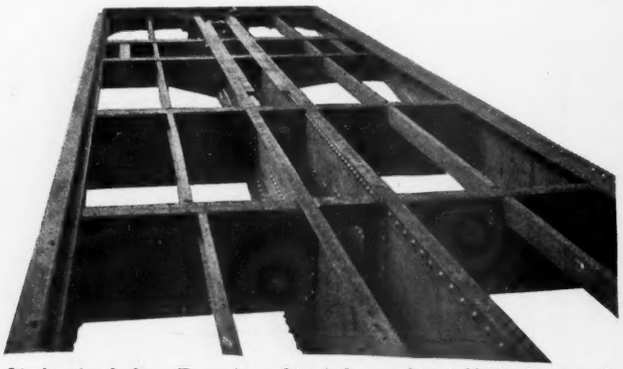


St. Louis & San Francisco Steel Cars—Baggage and Express Car.

plates of angles ⅜ by 3-inch, and the principal portion of the frame is of steel rolled shapes, as shown in the engraving. There is some wooden blocking between the posts and wooden carlines are used in the upper deck filling in alternately between the steel carlines. The exterior was finished with the National Steel sheathing, and this material was also used for the inside lining as shown in one of the engravings.

The underframing was calculated to support a distributed load of 80,000 pounds. A total end shock of 3,500,000 pounds was anticipated in the design of the center sills, with a long trussed capacity of 1,290,000 pounds. The maximum fiber stress for the sills was figured at 12,500 pounds per square inch.

The body of 60-foot baggage and express car weighs 65,900



St. Louis & San Francisco Steel Cars—Steel Underframe of Baggage and Express Car.

pounds, and the two trucks, 40,300 pounds, making the total 106,200 pounds. The body of the 70-foot mail car weighs 77,600 pounds and the trucks, 40,200 pounds, making a total of 117,800 pounds.

These cars were designed by the Pullman Company under the direction of W. A. Nettleton, superintendent of motive power of the "Frisco" system.

The largest exhibit space on the pier is occupied by the American Steel Foundries. The company is showing a full line of its manufactures. The central feature of the exhibit is a steel car truck mounted on an electrically-driven revolving turntable. It is a Simplex truck with cast steel body bolster Susemihl side bearings, Andrews side frames, Davis cast steel wheels and Simplex springs and brakebeams.

EARLY COMPOUND LOCOMOTIVES IN GERMANY.

The following quotation, taken from the American Engineer of May, 1884, gives an idea of the extent to which compound locomotive engines were understood and developed at that time: "From an interesting address of Mr. Von Borries, mechanical engineer in the service of the government, May 15, 1884, we learn that the compound locomotive at work in Hanover continues to give excellent results in practical working. As compared to the non-compound locomotives of the regular Hannoverian type; when the steam pressure is equal to nine atmospheres there is a saving of 17 per cent. of coal in its use; as compared with the non-compound locomotives, when the steam pressure is 12 atmospheres, the average saving in coal is 20 per cent. The 10 compound tender locomotives introduced last summer have also proved of good service, the coal consumption being about 10 pounds per mile, hauling four to six light wagons on level road. Since similar locomotives of the non-compound type do not exist, comparisons as to the relative efficiency cannot be made."

St. Louis & San Francisco Steel Cars—National Steel Sheathing in Interior.

The booth of the Gold Car Heating & Lighting Company is very brilliantly lighted by the new system of Acetylene car lighting, which is simple and entirely automatic.

MASTER CAR BUILDERS' ASSOCIATION.

Proceedings of the First Session of the Forty-second Annual Convention.

The first session of the forty-second annual convention of the Master Car Builders' Association was held on Young's Million Dollar Pier at Atlantic City, N. J., on Wednesday, June 17, 1908.

The president, George N. Dow, Lake Shore & Michigan Southern, called the meeting to order at 9:50 a. m., and extended an invitation to the past presidents of the Master Car Builders' Association and the president and past presidents of the Master Mechanics' Association to take seats on the platform. The chair introduced the Rev. Newton D. Cadwell, pastor of the Olivet Presbyterian church who offered prayer.

The Hon. Franklin P. Stoy, mayor of Atlantic City, welcomed the convention in a brief address to which reply on behalf of the association by Eugene Chamberlin of the New York Central Lines.

Mr. Dow, after a few well-chosen introductory remarks, then delivered his annual address, as follows:

President's Annual Address.

Forty years ago this month this statement was made at the second annual convention of this association, by the first president, A. W. Van Houten: "I trust that our deliberations will be harmonious and beneficial to ourselves and to the best interests of the railroad companies that we represent. Taking into consideration the millions of dollars, the expenditure of which the railroads entrust, in a great measure, to their respective master car builders, it is important for us to consider the best and most economical way to expend such an amount of money with credit to ourselves and to the best interests of our respective companies."

If this were true at that time, how much more applicable is it now? At that time the cars represented could be named in hundreds, while now they are numbered in millions.

The two great objects of this association are, first, to procure uniformity in car construction, and second, to secure the most economical results in the interchange of traffic between the railroads of the country. They are both so closely related that to secure the best results in interchange it is necessary that railroads carefully observe the standards adopted by the association. Of course, we all know that the standards of car construction adopted by this association are only recommendatory in character, but on the other hand, a closer observation of these standards will result in a decreased cost for conducting the interchange of cars, and thus promote one of the great objects of the association. It may be said that our standards are not permanent in character; that changes are constantly being made, but the reason for this cannot be laid exclusively at the door of the Master Car Builders' Association. The demands and conditions of the traffic and operating departments are as constantly changing, and as new conditions in operation arise, they must be met by new designs in car construction, and to the Master Car Builder the managing officer looks for results. It therefore behooves us to be alert at all times to meet these demands, and thus enhance the value of the work performed by the association. With this object in view we are assembled here today, and I would ask your earnest and careful consideration of the various recommendations which will be presented to you during our deliberations.

Each year our standards are being more carefully scrutinized by the operating officers; the application of couplers of the vertical plane or M. C. B. type, the complete equipment of cars with air brakes, the adjustment of height of couplers as formulated by this association have become the law of the land, and it has even been proposed to enact into law our standards relating to the protection of trainmen. It will thus be seen that more and more the actions of this association are being recognized, and emphasizes to us the absolute necessity of paying close attention to what we adopt.

It is not my intention to point out in detail the various recommendations made by your committees; they have labored faithfully during the year, and the results are before you in their reports. I only bespeak your careful study.

In the past there has been some difficulty on the part of some of the members and some of the car builders to determine satisfactorily from the published standards of the association important data on the protection of trainmen. When this was brought to my attention a special meeting of the executive committee was called, and as it was found that the work of the committee on "Standards" was so onerous, it was decided to appoint a special committee to review the standards of the association for the protection of trainmen, with a view of increasing their usefulness by more complex illustrations, and at the same time recommend such modifications as might be necessary to meet the requirements of modern car construction. This committee's report is submitted to the convention with the reports of the other committees.

A few thoughts suggest themselves to my mind which this association should consider.

The necessity for co-operation and co-ordination of the work of the various railway associations has led the American Railway Association to propose changes in its organization which will admit of more harmonious relations between the various railway associations, and at the same time tend to centralize the recommendations for authoritative action with that association. In view of the nature of a great deal of the work of the Master Car Builders' Association, it is important that this association co-operate to the fullest extent with the American Railway Association, and in order that this may be accomplished, some change in the constitution and by-laws of the Master Car Builders' Association will be necessary.

The constitution at the present time does not provide for filling vacancies which may occur in the office of president and vice-president or members of the executive committee, except by election at the convention, nor is it required that these officers of the association and members of the executive committee should be actually engaged in the railway service. I would therefore recommend that the constitution be changed to cover these points, after the subject is given full consideration by the proper committee.

In the past, a large list of subjects has been referred to the association, and in the future, I would recommend reducing the list so as to give better opportunity to investigate and discuss the subjects more thoroughly.

The importance of the work of the association is such that the members who accept membership on a given committee should do so with realization of the work required of them and fully understand the necessity of attending as many meetings of the committee as the chairman may feel is necessary to call. It should be remembered that when a member fails to attend a committee meeting the committee is not only deprived of the benefit of his experience, advice and opinion, but the representation from a given district, as it is generally the practice, in appointing committees, to endeavor to cover, as far as possible, different portions of the country. I would urge the members of the association to seek rather than avoid committee work. The subjects considered are all of moment to the railroads you represent and it is their interest as well as those of the association which must be considered.

In the past, it has been the practice by a great many repair men to ignore or neglect the use of the repair cards, as called for in rule No. 76 M. C. B. Rules of Interchange. Some look at this as a dishonest act on the part of repair men, but in my opinion it is only a case of neglect on the part of those making repairs. In order that the full benefit of the rule may be obtained, as was the intention of the members of this association when it was adopted, I would recommend to all heads of car departments the issuing of such instructions to their repair men as would make it impossible for them to either ignore or neglect the use of this card, and thereby avoid the suspicion of dishonesty.

The adoption of a standard M. C. B. coupler. Several years ago an ineffectual effort was made in that direction. I believe the time is now ripe for such action.

There has been a steady increase in the use of steel in car construction. The steel car has come to stay and I believe this association should give attention to this important matter to the end that its use may be extended more and more. I would recommend the appointment of a committee on standard steel shapes.

Several years ago the question of the adoption of standard dimensions for the box car recommended by the American Railway Association was considered, and a system of framing only adopted. The question was not given the consideration it deserves and to my mind is one that should be revived and studied to a conclusion. This subject at that time was referred to us by the American Railway Association, and we should complete our work and carry out the instructions given us. The appointment of a committee on this subject should be considered by your executive committee.

The past year has been a strenuous one for the mechanical officer. When we met here a year ago our shops were being pushed to their fullest capacity to keep in motion the immense traffic offered the railroads, but during the early winter a depression in business overtook us which has rendered necessary a general policy of retrenchment. Under these varying circumstances it has required the exercise of the utmost care and wisdom to properly conduct the affairs of our department of railroad work.

Commingled with our pleasures and perplexities we have been called to lay aside our work for a time to mourn for some who met with us a year ago; who have traveled to that undiscovered country from whose bourne no traveler returns.

During the year the grim reaper has taken from our ranks D. W. Hunter, James McBeth, H. W. Watts, J. T. Kebler, O. Stewart, Robert McKenna and W. N. Forney.

The mention of the name of Mr. Forney recalls to our mind one who has been most active, if not the most active, in promoting the interests of this association. No words of mine can fittingly express that feeling of love which permeates every fibre of our being for our former secretary, Mr. Forney. In the regular order of business committees will be named to prepare obituaries for incorporation in our proceedings.

It is my desire at this time to call attention to the splendid exhibition of mechanical devices furnished for your inspection and study by our friends the supply men. I trust that between the sessions of this convention you will take advantage of the splendid opportunity to become thoroughly acquainted with what is new and up-to-date in the various parts of car construction as exhibited on this pier.

Gentlemen, permit me to express the hope that the pleasures and benefits we derive from this meeting may be such that when we return to our homes we may be better equipped to shoulder the responsibilities of life with a greater degree of confidence and knowledge.

The secretary, Joseph W. Taylor, presented his report as secretary.

The secretary's report showed that in June, 1907, the active membership was 377, and that in June, 1908, it was 424; that the representative membership in June, 1907, was 249, and that in June, 1908, it was 275; that the associate membership in June, 1907, was 14, and that in June, 1908, it was 13; and that the life membership in June, 1907, was 15, and that in June, 1908, it was 14. The total membership is as follows: Active, 424; representative, 275; associate, 13; life, 14; total, 726.

The number of cars represented in the association compared with last year was stated to be as follows: June, 1907, 2,254,397; June, 1908, 2,283,330; increase, 28,933.

The report showed receipts and expenditures for the year of $14,091.67.

The report showed that 29 railroads and private car lines had signified their desire to become subscribers to the rules of interchange governing freight cars, and their names will appear in the list of subscribers when the revised code is issued. Five railroads have also advised of their acceptance of the code of rules governing the interchange of passenger equipment.

The report of the treasurer showed that there was a balance on hand of $6,956.

On motion the action of the executive committee fixing the dues for 1909 at $4.00 per vote was approved.

The following committees were appointed:

On Auditing: Eugene Chamberlin, H. L. Trimyer, J. W. Fogg.

On nominations: John D. Lentz, F. W. Brazier, Joseph E. Baker, H. D. Taylor, W. A. Nettleton.

On Resolutions: J. F. Walsh, F. H. Turner, G. W. Wildin.

On Obituaries: G. W. Wildin on D. W. Hunter; F. W. Brazier on James McBeth; L. H. Turner on H. W. Watts; T. B. Purves on J. T. Kebler; P. M. Hammett on O. Stewart; T. S. Lloyd on Robert McKenna; A. Sinclair on M. N. Forney.

Prof. W. F. M. Goss (University of Illinois): I suppose few members of the association understand better than I how great is the interest of the association in the Master Car Builders' Laboratory. The up-building of this laboratory, while it has been slow, has been somewhat steady, and it has had the support of a large number of the influential members of this association, and it has had, I think I may say, the unanimous support of the voting association as a whole. I never can tell you how much pleasure I have had in having some part in that process. It has been one of the enjoyments of recent years that I have been associated with you as an association in the conduct of work in the Master Car Builders' Laboratory, and it goes without saying that in relinquishing my responsibility at Purdue University, it has been one of the difficult things to relinquish thereby the relations which I have sustained with this association to which I have just referred. While I may regret having given up the responsibilities of that laboratory I have great pleasure in knowing that one has assumed charge at Purdue University who is altogether worthy of the responsibilities which come upon him and whose work as an experimental engineer is already well known all over this country and elsewhere. Prof. Charles Benjamin was born in the great state of Maine. He graduated from Orono college and for two decades has been professor of mechanical engineering at the Case School of Applied Science in Cleveland and he last year was appointed to be the dean of the Schools of Engineering of Purdue University, and as such, becomes the responsible head of the Master Car Builders' Laboratory. Professor Benjamin received the degree of doctor of engineering from the Case School of Applied Science, and I have great pleasure in introducing him to you.

Professor Benjamin:—It is with a great deal of pleasure that I come to the first meeting of your association. I realize very deeply the responsibility which I have incurred, especially the railroad men, in undertaking the work which Dean Goss has carried on for so many years so successfully, and I feel that this is not the time or the place for me to say very much. I am taking up this work with a great deal of enthusiasm and a great deal of courage, and still I cannot hope to be a full fledged railroad engineer on so short a notice. I am willing to learn, and I hope I shall be able to serve you in such a way that you will not regret too much the fact that Dean Goss has left that position.

The secretary announced a meeting of the "Arbitration" committee for Wednesday afternoon at the Marlborough-Blenheim.

The president then introduced E. A. Mosely, secretary of the interstate commerce commission, who delivered the following address:

Address of Secretary Moseley.

Since the last meeting of your association the employers' liability law of June 11, 1906, to which I called attention in my remarks last year, has been declared unconstitutional by a bare majority of the supreme court. That legislation of this character is deemed necessary, however, is shown by the fact that congress has enacted a more drastic statute, confining its operation to the field of commerce subject to federal regulation. The present law provides that if any employe of a carrier by railroad shall become injured while engaged in interstate commerce, because of a violation by the carrier of any statute enacted for the safety of employes, the fact that the injured employe may have been guilty of contributory negligence shall not relieve the carrier from liability; nor does the injured employe assume the risk occasioned by the carrier's violation of such a law. Neither may carriers subject to the statute exempt themselves from the liabilities created by the law by means of any contract or rule. The law therefore greatly increases the financial responsibility of interstate carriers to their employes, and makes it necessary for them to exercise the greatest care in the employment of men, as well as to keep all equipment in proper repair.

An important decision rendered by the supreme court of the United States one month ago in the case of St. Louis Iron Mountain & Southern Railway Company v. May Taylor will be of interest to you. The original safety appliance act of March 2, 1893, authorized the American Railway Association to designate the standard height of drawbars for freight cars to the Interstate commerce commission, and this designation became effective after being certified to the commission and notice of same having been given by the commission. The standard was fixed at 34½ inches for standard gage cars, with a maximum variation of three inches between loaded and empty cars. This portion of the statute is apparently a delegation of legislative power, and ever since it became effective doubt of its constitutionality has been expressd. This doubt has been removed by the decision referred to; and the court, speaking through Mr. Justice Moody, further holds that the maximum variation of three inches between loaded and empty cars is downward from 34½ inches, so that drawbars on standard gage freight cars must not be higher than 34½ inches nor lower than 31½ inches to comply with law.

Another principle of fundamental importance to the members of this association was announced by the court in delivering its opinion in the Taylor case. The court determined that the exercise of reasonable care to keep equipment up to the standard required by the safety appliance law is no defense in an action for damages for personal injury to an employe, when such injury is caused by violation of the statute. In unmistakable language it was held that the statute imposes upon common carriers by railroad the absolute duty of keeping their equipment in the condition required by law at all times. I quote from the opinion of the court as follows:

"The congress, not satisfied with the common law duty and its resulting liability, has prescribed and defined the duty by statute. We have nothing to do but to ascertain and declare the meaning of a few simple words in which the duty is described. It is enacted that 'no cars, either loaded or unloaded, shall be used in interstate traffic which do not comply with the standard.' There is no escape from the meaning of these words. Explanation cannot clarify them, and ought not to be employed to confuse them or lessen their significance. The obvious purpose of the legislature was to supplant the qualified duty of the common law with an absolute duty deemed by it more just. If the railroad does, in point of fact, use cars which do not comply with the standard, it violates the plain prohibitions of the law, and there arises from that violation the liability to make compensation to one who is injured by it."

Further on in the opinion we find expression of the following humane doctrine:

"Where an injury happens through the absence of a safe drawbar there must be hardship. Such an injury must be an irreparable misfortune to some one. If it must be borne entirely by him who suffers it, that is a hardship to him. If its burden is transferred, as far as it is capable of transfer, to the employer, it is a hardship to him. It is quite conceivable that congress, contemplating the inevitable hardship of such injuries, and hoping to diminish the economic loss to the community resulting from them, should deem it wise to impose their burdens upon those who could measurably control their causes, instead of upon those who are in the main helpless in that regard."

At your last convention I called attention to the fact that in many cases carriers have paid hundreds of dollars in fines for violation of the safety appliance acts where repairs necessary to avoid the penalty would have cost but a few cents. The penalty prescribed for violation of the safety appliance law is merely nominal, but it is obvious that the financial burden that may be imposed upon carriers in damage suits where failure to keep equipment in repair is the cause of injury to employes may amount to many thousands of dollars. Intelligent self interest therefore demands that carriers subject to the act shall keep their equipment in the highest possible state of efficiency.

The standards of your association are not trivial matters which may or may not be conformed to at the pleasure of individual members. Legislation is now pending before congress which aims to make your standards for the protection of trainmen the law of the land. It is true that the bill covering this subject failed of passage at the recent session, but it is sure to come up again, and it is hoped that after you and other friends of such legislation have had ample opportunity for consideration and discussion congress will enact a law of the character mentioned. If it is the practice to depart from the standards which have been approved and established by this association tne enactment of such a law will necessarily involve many changes which would be obviated by a close adherence to standards. Each of you, as the master car builder of your road, should take the most painstaking care to see that every car owned, used or handled by your road complies with the M. C. B. standards in all particulars. A car used today by a road in Maine may be handled next week by an employe of a road in Illinois. In the darkest hour of the night that employe's life may depend upon finding the grabiron, ladder or other safety appliance in the same location upon every car, and it is not too much to expect that the standards you have adopted or may adopt shall become as binding as any statute enacted by congress. That congress is well disposed towards legislation of this character is well illustrated by the course of the so-called "ash-pan bill." That measure was passed by the house of representatives under suspension of the rules and by unanimous vote, without having been reported from the committee to which it has been referred. The bill then went to the Senate, where it met no opposition. The law will become effective on January 1, 1910. Although this law more particularly affects the master mechanics of American railroads, it is nevertheless of interest to you as tending to indicate the trend of congressional action.

Each of you may justly feel proud of the history of this association and the record of the master car builders of the United States. Uniformity of equipment, to which you have dedicated your work and devoted your earnest and successful efforts, is the most important, the most essential feature in railroad equipment, and whatever legislation the future may bring forth will be a legal recognition of what you yourselves have already accomplished.

I regret to say that the necessity of prosecutions for violation of the safety appliance law still continues. As evidence that suits have been properly brought, and in a spirit of fairness, I will say that prosecutions involving 2,260 violations have been filed in court. Of this number 1,041 cases have been disposed of by trial, confession of judgment, and compromise, and penalties have been collected to the amount of $80,200. Twelve cases have been dismissed by the government, and in 1,207 cases trial is pending. In but 10 cases have decisions unfavorable to the government been rendered. Most of these cases have been appealed, and it is thought probable that in the higher courts the government's contention may be sustained. This record of law enforcement, it is believed, cannot be equalled. Great progress has been made by carriers during the past year or two, and the general condition of equipment throughout the country shows such marked improvement that we believe the time is near when these appliances will be kept in the highest possible condition of repair and the necessity for prosecutions will be largely eliminated.

Gentlemen, great responsibility rests upon you in the performance of your duties. From deductions based upon reports made to the commission I find that every two hours and fourteen minutes a railroad employe is killed, and one is injured more or less seriously every seven minutes with the regularity of clockwork. During the few minutes that I am speaking here to-day at least two employes have been injured, and between the time this convention was called to order this morning and its adjournment this afternoon it is certain that two railroad employes will have given up their lives. This one fact will impress upon you in the most emphatic manner your solemn responsibility to railroad employes and the public. Under the beneficent provisions of the safety appliance law, and as a result of your intelligent efforts as master car builders, the number of trainmen killed and injured in coupling and uncoupling cars has decreased each year since the passage of the law, from one for every 20 employed to one for every 73 employed. For this gratifying result you should receive your full share of credit. If the railway owners of the country would place in your hands the power to determine the amount of money to be expended on equipment, I assert with confidence that the condition of equipment would be far better than it is under the present system. It is true that your properties must be managed with a view to economy, but that economy is ill-advised that permits cars and engines to be operated in an unsafe condition.

This is the seventh consecutive convention of your association I have been privileged to attend. At no gathering of railroad men do I obtain more valuable information nor derive greater pleasure. I believe your members have confidence in me, and for you I entertain the highest regard and respect. We are co-workers to the same end—safety upon American railroads. The chief aim and purpose of the inspectors employed by the commission under the safety appliance law is safety for employes and travelers upon railways, not prosecution of the railroads. Their most earnest desire, and mine, is to lessen the risks incident to railway employment and reduce the number of casualties to employes and the public. Indirectly, the federal inspection service also conserves the revenues of the railroads by diminishing the damages resulting from personal injury suits.

The commission's inspectors come from the ranks. They enjoy the confidence of railroad employes, and while commingling with them at the lodge and meeting rooms of their brotherhood organizations, which are freely open to them, they urge upon employes care and discretion in the performance of their duties. These inspectors know from experience the dangers attending the work of train service employes on railroads; they know the results of taking chances and continually seek to impress employes with a proper regard for the lives and limbs of themselves and their fellows in the service. It is a source of much satisfaction to know that the number of deaths and injuries due to taking risks which are on the border line of recklessness is constantly diminishing, and I attribute much of this to the conscientious efforts of these inspectors in behalf of their former co-employes in yards, upon trains, and in meeting and lodge rooms.

In this progressive age the loss of life and limb upon railroads is appalling. It is a matter of most vital concern to all railway interests. During the past few years congress has given serious consideration to many bills, the express object of which was to promote safety upon railroads, and some stringent legislation of this character has been enacted. In view of this earnest endeavor on the part of congress to solve the problem of minimizing railway casualties, it is eminently fitting that the machinery provided should be utilized to the limit of its capacity.

The man at sea who saves a human life, the man upon a railroad who, at the risk of his own life, saves or attempts to save the life of another, is rewarded with a medal from the Nation. So, also, the consciousness of duty well performed is the reward of the commission's inspector, who, by his unremitting efforts, contributes effectively to the preservation of life and limb. For what greater gratification can come to a man than that derived from the knowledge that by his efforts some human life has been saved to family and to country? Just so, in your deliberations in your annual conventions, and in your work when you go back to your various fields of labor, you can always bear in mind the inspiring thought that you are contributing to the safety of employes and the traveling public by maintaining your equipment in the highest possible state of efficiency.

Speaking for myself and for the inspectors of the commission who are here to-day, I wish to express our appreciation of your co-operation and the kindly feeling which you accord us.

The secretary announced that the executive committee submitted to the association for approval for honorary membership the name of A. G. Steinbrenner, Mr. Steinbrenner having been a member of the association since 1883. (Approved.)

The secretary announced that notice regarding certain proposed amendments to the constitution had been received in proper form, and that these proposed amendments would be sent to the members before the end of this year.

On motion the chair was authorized to appoint a sub-committee of three members of the executive committee of the association to confer with the proper committee of the American Railway Association and report to the executive committee so that the recommendations of the executive committee as to changes in the constitution and by-laws necessary to secure greater co-operation between the American Railway Association and other railroad associations may be distributed to the members of the association prior to December 15, 1908.

Mr. Seley then read the report on "Revision of Standards and Recommended Practice," exclusive of "Protection to Trainmen." [An abstract of this paper will be found on page 141.]

Discussion on Revision of Standards.

At the suggestion of J. E. Muhlfeld (B. & O.) the question of whether 1-16-inch or ⅛-inch clearances for journal boxes was referred to letter ballot, the two sets of dimensions being submitted.

On motion the suggestion of O. C. Cromwell (B. & O.) to the committee (which had been disapproved by the committee) was approved.

Mr. Cromwell's suggestion was described in the report as follows:

"It was stated that the Baltimore & Ohio had had some instances of failures of the axles at the center due to grooving at the juncture of the cylindrical portion with the tapered portion. To overcome this the company has changed its drawings to gradually work the taper down to the center, joining the tapered portions with the following radii:

"Axle A.—3¾ by 7-inch journal, 13 feet 0 inches radius,
"Axle B.—4¼ by 8-inch journal, 14 feet 0 inches radius,
"Axle C.—5 by 9-inch journal, 15 feet 0 inches radius,
"Axle D.—5½ by 10-inch journal, 26 feet 8 inches radius."

In discussing the recommendation as to brake shoes J. E. Muhlfeld said: I suggest that investigations be made as to a permissible re-design of the brake head which, in combination with the present arrangement of hanger suspension, would prevent the brake beam hanger from coming out of the recess, in event of the brake shoe or brake shoe key becoming lost. I have seen brake heads fitted up in that manner, and they seem to have the required capacity of preventing the brake beams going down. In view of the higher capacity freight equipment cars, the increased percentage of braking power and the more severe air brake conditions in general, we think it advisable that a recommended practice section or bar, and a minimum allowable standard section of bar, be specified for brake beam hangers and for their suspended bolts or pins. The standard practice alternate brake head as shown on M. C. B. sheet 8, allows for the use of a hanger one inch in diameter, which will give a substantial allowance for wear to prevent liability for failures at the corner, and which will restrict the vertical movement of the brake head on the hanger when brakes are set and released. We consider that the use of the 1-inch round section bar for brake hangers and pins should be recommended practice for new cars, and that no less than ⅞-inch round section for bar and pin should be standard practice. It is also desirable to give free movement of the brake beam laterally in order to follow the wheels in the truck when curving, and that the design at the point of suspension to the column casting, or otherwise located fulcrum, shall be as shown on page 74 in the Proceedings of 1907.

On the subject of brake shoe keys Mr. Muhlfeld said: The Baltimore & Ohio has a considerable number of its freight equipment that is dumped at the lake ports, and where there is liability of brake shoe keys, center plate pins and other parts that may be used and seated by gravity becoming misplaced or lost. We have found that by deviating somewhat from the M. C. B. dimensions of the brake shoe keying lug opening that this provides for the wear of the brake head lugs, and prevents liability of the brake shoe keys coming loose and dropping out when the cars are dumped. It might be well to give consideration to making this change in the standard brake shoe. Regarding the opening of the brake shoe lug, we think the key should be made tighter and it takes up in the wear in the brake head, which maintains the tightness of the brake shoe key at all times, and in that way we have overcome the losing out of the keys. In regard to the present limits of deflection for No. 1 and No. 2 brake beams, we consider the present limits sufficiently low. We have quite a number of 80,000 pounds capacity cars that come within the low weight, and would permit us to use the No. 1 brake beams.

Mr. Seley: Mr. Muhlfeld's recommendation, regarding the matter he has just specified, came to the committee on "Revision of Standards and Recommended Practice" after the report was prepared and I have an appendix which includes all such matters, and with your permission I will read at this time the matter covering this particular point. The committee would advise that if the suggestion to use 1-inch diameter material for brake hangers is accepted, it will be necessary to modify the standard brake head, as the entrance to the hanger opening is 15-16-inch. Your committee is of the opinion that it might be well to modify this standard brake head so as to use 1-inch irons if desired, but not to change the recommended practice adopted last year that the brake beam hanger shall be ⅞-inch in diameter.

Your committee is not in favor of the curved bearing for the brake hanger as shown on page 74 in the proceedings of 1907 and so stated last year and was supported by the opinion of the convention.

In this connection cut Figure 4 of the M. C. B. Sheet 8 was copied in error and should be removed from the plate.

The committee would add this to the sections under consideration.

Mr. Seley: The question is the approval of the decision in general, and the recommendations, which are very important as giving the M. C. B. an expression on standard brake beams. I hope very much that these two paragraphs will go to letter ballot.

F. F. Gaines (Central of Georgia): I move that the committee on "Standards" in proposing its other changes, submit to letter ballot the question of the adoption of a standard, and also make the standard ⅞-inch and the recommended practice for new cars 1-inch, and if necessary to change the drawings of the brake head to agree if it is adopted. (Adopted.)

Mr. Seley read a letter from F. M. Nellis, secretary of the Air Brake Association, as follows:

"A great deal of trouble has been experienced from the non-uniform practice of intermingling straight groove and taper groove rings and coupler heads in air brake service. As the Air Brake Association's 1907 Proceedings showed, a great many rings have to be whitted and trimmed to fit the various heads. It would seem that a uniform coupling head, with respect to groove and packing ring, should be adopted.

"Our members in the severely cold districts of northern United States and Canada complain of very great annoyance from the leaks at the hose couplings of freight trains in winter time. This trouble is brought about by the hose freezing rigid, becoming practically stiff pipes for the time being, and breaking joint at the hose coupling when the slack of the train is taken. So great has this trouble become that on some of our Canadian roads the members report their inability to operate over a certain number of air brakes in the head end of the train. This is a hose trouble, and not a gasket and coupling head trouble. Most roads are using a lengthening nipple to moderate this trouble, but the frozen hose trouble still remains.

"In the 1905 Proceedings of the Air Brake Association you will find a very good treatise on 'Leakage in Brake Pipes at the Coupling Heads,' which is due wholly to the abnormal slack in the draft gear of the cars. The slack in some of these 35-car trains will aggregate 15 or 18 feet.

"At the St. Paul Convention, just adjourned, prominent mention was made of scrapping many old coupling heads which had evidently been in service ever since the adoption of automatic brakes on freight cars. This scrapping is objected to by some roads who believe that the coupling head should never wear out. One member stated that he found the gasket groove had been cleaned out so frequently that it was unduly enlarged and a standard gasket could not make a tight joint. Also the bearing portion of the tongue and groove of the couplings were so badly worn that the gasket would not set up high enough to make a tight joint. It seems that a great many hose coupling heads should be scrapped for the reasons just mentioned.

"The Air Brake Association has made no systematic investigation of automatic air hose couplings and is not in a position at this time to give any information on the same to your committee."

In view of this, therefore, the committee is without information regarding this point, and can only suggest this matter as reference for special committee work if desired by the executive committee.

Mr. William Forsyth (Railroad Age Gazette): I move that a committee be appointed in accordance with Mr. Gibbs' suggestion to design a standard brake shaft, brake wheel, and brake wheel fit, etc., and the matter of the increase of size of the brake chain, as referred to in paragraph 56, be referred to the same committee.

Mr. Sanderson (Virginia): I ask Mr. Forsyth if he will not include in that recommendation the matter in paragraph 53, as they should all go together.

Mr. Forsyth: I will accept that.

The motion was carried.

Mr. Sanderson: I move that the recommendation of the committee with reference to sizes of brake chains be approved and referred to letter ballot. (Carried.)

On motion of Mr. R. P. C. Sanderson the recommendations of the committee with reference to siding, roofing, flooring and lining were approved and referred to letter ballot.

Mr. Muhlfeld: In connection with the matter of standard pipe unions, I may say that ball and joint unions are coming into use pretty generally on cars and we find the unions manufactured by the different makers have different sizes of tail pieces and couplings and coupling irons. We think that is a subject which should be gone into in connection with the gasket already adopted as our standard practice, in regard to the matter of interchangeability of ball seat or non-gasket. I make a motion to cover these suggestions. (Carried.)

On motion of Mr. Sanderson the recommendations as to advancing specifications for woven and combination woven and wrapper air brake hose to standards were approved and ordered submitted to letter ballot.

On motion of R. L. Kleine (P. R. R.) the recommendations on air brake appliances were approved and ordered submitted to letter ballot.

Mr. Seley then presented the appendix to the report, which contained recommendations as follows:

"In view of the cars that are now marked 100,000 pounds capacity having allowable overloads ranging from 10 to 25 per cent it has been found that the impacts and stresses transmitted to the unspring-borne parts of the truck, due to the truck bolster springs running solid, has a very destructive effect, more especially when traversing indifferent track conditions at high rates of speed. We would suggest that consideration be given to the design of a spring that will be suitable for 120,000 pounds capacity cars with arch bar trucks, making use of 5½ by 10-inch journal axles and other parts interchangeable with the usual designs for 100,000 pounds capacity cars in order that a more suitable spring would be available for minimum light and maximum loaded weight of cars that are now marked 100,000 pounds capacity but where the allowable overload may be as high as 25 per cent due to transportation and traffic requirements.

"From tests made on locomotive tenders on this railroad and from experience with foreign freight cars operating over this line, which have been equipped with cast steel truck side frames of various designs, there have been quite a number of failures, which, while due to some extent to inherent deficiencies in design and material, have been contributed to by shock that would not have occurred had there been adequate spring resistance to the load. With the arch bar type of trucks there is a certain amount of flexibility, but with the truck side frames such as those made of cast steel the lack of flexibility increases the liability for fracture on account of impact and shock which can be expected from ordinary service conditions."

The committee would recommend that this be referred to a special committee to ascertain the necessity for additional higher capacity springs, and to propose designs if necessary.

John McE. Ames of the American Car & Foundry Company suggests a change with reference to flooring on sheet M. C. B. 24, thte table of dimensions to read as follows:

A—5, 6, 7, 8, 9, and 10 inches.
a—4¾, 5¾, 6¾, 7¾, 8¾, and 9¾ inches.
b—4¼, 5¼, 6¼, 7¼, 8¼, and 9¼ inches.
c—4¼, 5¼, 6¼, 7¼, 8¼ and 9¼ inches.

This is in line with the recommendation under paragraph 71 of the report and which has the approval of the committee.

W. R. McKeen (Union Pacific) makes the following suggestion: "M. C. B. Sheet 9, Dead and live lever, has the following note and an arrow head to the center hole only: 'Not less than 1 3-32 inches nor more than 1⅛ inches,' while on cylinder lever, floating lever, floating lever bracket, dead lever guide, truck lever connection, and connecting rods, diameter of holes is given as 1⅛ inches. Would suggest omitting diameters of holes on the above, and add in large type the following: 'All holes for brake pins not less than 13-32 inches in diameter, not more than 1⅛ inches diameter.'"

The committee would approve this suggestion:

A. Gibbs of the Pennsylvania Railroad suggests: "We are experiencing a number of accidents to train men resulting from brake staffs failing in the weld, not only on repaired cars, but in some instances on new cars built for individuals by freight car builders. This matter has become so serious that we deem it necessary to call it to your attention as chairman of the committee on "Standards," with a suggestion that a requirement be placed in the standards that no brake shaft shall be welded."

The committee would approve this suggestion, except to recommend that it be placed among the recommended practice, at least for the present.

On motion of E. W. Pratt (C. & N. W.) the recommendations of the committee were adopted as to the appointment of committees and submitting questions to the letter ballot.

Mr. Pratt here read the report of the committee on "Triple Valves" [An abstract of the report will be found on page 140], which was received and ordered spread upon the records.

Dr. Goss next read the report on "Brake Shoe Tests." [See page 142.]

Discussion on Brake Shoe Tests.

Dr. Goss: I want to call your attention to the Appendix I which is the record of the year with reference to routine work, to Appendix II, which is the detailed account of the research of the year as conducted under the general direction of Dean Benjamin, of Perdue University. Appendix III is not entirely filled out but the data for it are in hand and the results will appear in the published proceedings.

Before I take my seat, I want to refer to a criticism of the report which has been submitted to the committee by F. W. Sargeant, who always has taken great interest in the work of the committee, in which he suggests that instead of giving the marking upon the shoes in connection with the description thereof, that we give the trade names. Mr. Sargeant writes as follows:

"Referring to the Table 1 of shoes tested I would call your attention to the column 'Marking on Shoe.' This marking does not signify anything, and it will be better to simply designate the trade name of the shoe and its description as I have outlined it in the table attached, for the reason that there are some mistakes in the marking of the shoe. For instance, No. 161 is a Streeter shoe and not Diamond S as the trade mark would indicate. This is a mistake on the part of one of the molders in applying the wrong trade mark. Shoe No. 163 was dated 2-20-1900, the date of the U patent. Shoe No. 205, should be marked P. P. Co., the mark of the Pullman Company. The markings do not signify anything, whereas the trade names, as indicating the particular type of shoe, are familiar to all railroad men."

I think the criticism is a fair one, but throughout this work the committee had a great deal of trouble in designating the thing which it had worked upon. We have in some of our earlier reports attempted to give trade names and then have been told that we made mistakes; and the committee believed that the wise thing to do was to give what was on the shoe and that is all the designation we have on record. The committee has caused the shoes which have been subjected to test this year to be sent to Atlantic City, and while I have not been able to get at them this morning, I am hoping to have them on exhibition in this room, during this convention. Any one who may be interested in this matter will have an opportunity to look over the shoes.

Mr. Sanderson: I move that it be the sense of this convention that the recommendation of the committee for future work be urged on the committee of next year for its work.

Mr. Muhlfeld: I agree in what Mr. Sanderson said, and I wish to say that the report of this committee brings out some very important information and I think it would be of great advantage to railroad companies in deciding questions pertaining to brake shoes as well as to wheels. It appears from the report of the committee that the type of wheel on which the brake shoe is used largely affects the co-efficient of friction as well as the quality of the brake shoe.

In view of the continued increase in the average running speeds of freight trains and in the brake shoes pressures on account of the percentage of automatic braking power, due to the use of high speed and high pressure control, the higher rated pressure retaining valves and the greater calculated braking pressures, it is important that the allowable brake shoe for application to equipment in interchange shall be able to withstand high and continuous heating (due to braking pressure and speed), as well as impact, and give the minimum wear and heating to brake shoes and wheels consistent with the proper co-efficient of friction. From examination of a considerable number of various kinds of system and foreign brake shoes and brake beams that had found their way to the scrap, it was noted that 25 per cent of all brake shoes examined were removed because of breakage, and that 45 per cent. of all brake beams that had been removed were because of the worn condition of one or both brake heads, the evidence being that most of the wear was due to broken brake shoes. Of the removed brake shoes examined it was found that the average weight of the remaining piece of the broken shoes was 8½ pounds, whereas that for the unbroken shoes was 10½ pounds. Failures such as referred to caused by wear and breakage involve liability of accident as well as greater costs for maintenance. It has been found that the difference in mileage of certain suitable brake shoes may vary from 3 to 1 when used under similar wheel, braking pressure and service con-

ditions and which may be further affected as 2 to 1 by application to steel tired or chilled cast iron wheels.

In the committee's report, while the wearing and frictional qualities of brake shoes have been covered, when used in connection with chilled cast iron and steel tired wheels, the item of wear, grooving or heating of the treads of wheels has not been commented on. As the conclusions justify the use of an insert type of brake shoe, the quality of the material in the insert and in the body of the shoe is one of considerable importance. Furthermore, the desirability of reinforcing the body of the shoe or the keying lug, or both, for certain speeds, brake shoe pressures and service conditions is one that should be investigated and the allowable limit of wear defined. I would, therefore, move the suggestion that the committee's report be accepted and that the committee be given the necessary additional facilities that it desires in order to carry on its work and that they be requested to submit a proposed specification covering the items of material reinforcement, test and limits of allowable wear, and which will cover the most suitable car brake shoe for steel tired, and cast iron wheels for passenger and freight service under the different braking pressures. (Motion seconded and carried.)

Mr. Curtis next presented the report on "Tests of M. C. B. Couplers." On motion discussion on this report was deferred.

Adjourned.

TRIPLE VALVE TESTS.*

Your committee on "Triple Valve" Tests wishes to report that the new 100-car, 10-inch, brake-cylinder testing rack has been built and shipped to Purdue University at Lafayette, Ind., and that the material is now stored awaiting the completion of a room that is being especially built for housing the test rack. We are informed by the Purdue authorities that this building will be completed about June 20.

The committee, to which the duties were assigned of revising the code of tests for triple valves, wishes to report that until the new rack is installed and valves furnished for testing or for use in tests it will be unable to revise the code. During the past year a new design of triple valve has come out, which your committee is assured will be presented for test later on.

ADDITIONS TO LIST OF EXHIBITS.

Since the publication of the List of Exhibits in our issue of June 17, the following have been added:

Pressed Steel Car Company, Pittsburg, Pa.—On track near the Philadelphia & Reading station an all steel passenger coach. Represented by O. C. Gayley, C. E. Postlethwaite, Chas. A. Lindstrom, W. H. Wilkinson, J. S. Turner, Victor Von Schlegell, C. D. Jenks, J. G. Bower, H. E. Swartz and A. P. Bowen.

Coale Muffler & Safety Valve Company, Baltimore, Md.—Safety valves. Represented by H. C. McCarty.

Planet Company, The, Chicago.—Door hanger and automatic vestibule curtain hooks. Represented by H. J. Summers.

Boker & Co., Hermann, New York.—Tool steel, Novo drills and Novo patent sections. Represented by Ellsworth Haring.

International Traction & Power Company, Pleasantville, N. J.—Demonstrating a new crank engine. Represented by J. C. Reuter, Thomas F. Durham and Thomas F. Deegan.

Babcock Box Company, New York.—Wire bound packing cases for prevention of concealed losses. Represented by L. W. Gill.

Trenton Malleable Iron Company, Trenton, N. J.—The Trenton hopper door. Represented by R. C. Oliphant and Sinclair J. Johnson.

Simmons, G. P., Utica, N. Y.—Journal lubricating device. Represented by G. P. Simmons, George J. Bingham and B. T. Gilbert.

Bingham & Taylor, Buffalo, N. Y.—Improved journal box cover and improved pedestal. Represented by W. P. Taylor and James W. Gibney.

Whiting Foundry Equipment Company, Harvey, Ill.—Model of mechanical and electrical brake for hoisting mechanisms as applied to crane. Represented by C. A. Hardy and B. C. Mills.

*A report presented at the annual convention of the Master Car Builders' Association at Atlantic City, N. J., June, 1908, by a committee consisting of A. J. Cota, R. K. Reading, E. W. Pratt, F. H. Scheffer and D. C. Ross.

THE USE OF STEEL CASTINGS IN CAR CONSTRUCTION.

At a meeting of the New York Railroad Club some months since, one of the members, who is up-to-date in locomotive and car work, and always endeavoring to improve present practice and strengthen his equipment, referred to the advances made in the use of steel castings for car work. Doubtless most readers can recall the time when grey iron castings were considered good enough for their equipment—in the days of 15- and 20-ton capacity freight cars. The vertical plane drawbar, the link and pin were then used. Break-in-twos were every day occurrences, also broken draft gear castings, and failures of castings on all kinds of car equipment and locomotives as well. Then came larger cars, M. C. B. standard couplers, malleable iron castings and pressed steel parts, one-piece bolsters and trucks made of pressed steel, also, end and side sills, stake pockets, draft lugs, etc.

Gradually nearly all grey iron castings were replaced with malleable. But the failures continued; couplers, draft lugs, bolsters, centre plates, side bearings, striking plates, filler castings, truck columns, bottom brake lever connections,—all gave trouble on account of breaking. Some trouble was also experienced with pressed steel parts used on coal cars, where the seepings from the coal and oak of the cars or drippings from refrigerator cars came in contact with them. We even see them today, eaten and being eaten away. Accordingly, another transition has taken place,—this time to a material possessing at least twice the strength of malleable iron, and a resistance (in case of castings made from basic open hearth steel) to the elements and seepings from cars, which no intelligent manufacturer or railroad man will hesitate to acknowledge gives the steel castings, and cars when rightly equipped, an increased life.

It has not been definitely determined, as far as we know, why, for example, stake pockets, draft lugs or bolsters made from rolled steel (or pressed steel) should be eaten away by drippings from coal and refrigerator cars. But it is an acknowledged fact that such is the case, and that basic open hearth steel castings and bolsters are not thus effected. It seems reasonable to suppose that in the process of casting a protective skin or shell is formed upon the surface.

The use of good basic open hearth steel castings often slightly increases the first cost of cars and locomotives, but the freedom from frequent renewals and repairs should more than compensate for the additional first cost. The use of cast steel end sills, cast steel draft sills, cast steel car trucks, cast steel locomotive frames and driving wheel centres is not uncommon, and it is known that the cast steel bolsters, properly designed and made, will outwear any bolsters made from structural material ever produced. Some roads are now experimenting with cast steel underframes for tenders with good results. Freedom from corrosion, rigidity, less liability to distortion and failure are the results from their use. Cast steel front bumpers for locomotives offer a protection to the cylinders in wrecks, which never could be attained by use of the wooden bumper beam. A cast steel car end sill battered in as are frequently rolled and pressed steel end sills is seldom seen, nor do cast steel draft sills buckle as do rolled or pressed steel centre sills.

Hick's Locomotive & Car Works of New York and Chicago has no exhibit this year, but is ably represented by I. H. Case, who is distributing one of the neatest souvenirs extant.

One of the interesting track exhibits is that of the Standard Steel Car Company, Pittsburg, Pa., in the shape of an all steel box car, 100,000 lbs. capacity. The car is 40 feet long, 8 feet 4 inches high and 8 feet 6 inches wide, all inside measurements. Its cubical capacity is 2,450 cubic feet, and weight 40,100 pounds. There is absolutely not a stick of wood on the car.

REVISION OF STANDARDS AND RECOMMENDED PRACTICE.*

Standards.

Standard Journal Boxes and Contained Parts. (Pages 552-553.)

There should be shown on sheet M. C. B. 3 a dimension giving the distance from the center line of the bolt hole to the inside bearing face of the lid.

For journals 4¼ by 8 inches, sheet M. C. B. 4, the inside dust guard wall should be restored and it should be joined to the inside side wall with an opening 2¾ inches radius, with the center located 1 inch above the horizontal center line of the box.

For journals 5 by 9 inches, sheet M. C. B. 14, the dimension from center line of journal box to edge of wedge stop should be changed from 5 3-16 inches to 5⅛ inches, to give the same wedge clearance, 1-16 inch, as in 4¼ by 8 and 5½ by 10-inch boxes.

The note "Total latral (extreme positions of axle) equals ⅜ inch" on Plate No. 16, 1907, is in error and should be eliminated.

The note "5 11-16 inches to end of wedge and face of stop" on Plate No. 16, 1907, should read "5 11-16 inches to face of stop."

For the 5 by 9-inch box the center from which the lower half of the circle is struck should be raised ¼ inch, making the depth 1⅝ inches, the same as in the present 5½ by 10-inch box.

Axles (Pages 554-556. Sheet M. C. B. 7.)

The fillet at the back end of journal on 40,000 and 60,000-pound axles A and B should be changed to ¾ inch.

Brake Head and Shoe (Pages 557-558. Sheet M. C. B. 8.)

That the present 5-16-inch projection, top and bottom, at back of brake shoe which forms spacer between lugs of brake head be increased to 9-16 inch.

Brake Beams. (Pages 558-559. Sheet M. C. B. 22.)

The recommendations of this committee made last year (1907) regarding brake beams were all adopted except the three questions covering the standard beams and tests. It is the belief of the committee that standard beams are advisable and desired by the association, and that the objection which defeated the adoption of the standards proposed was principally on account of the test limitation which barred economical commercial sections for solid beams. The committee, therefore, has determined to lower the limits of deflection for 1-16 inch to 6,500 pounds for No. 1 beams and 12,000 pounds for No. 2 beams. The 6,500-pound limit will permit the use of 6-inch 12¼-pound I-beam sections for use on light cars, and the 12,000-pound limit will provide beams of ample strength for all heavy freight equipment unless of special character. These standards have no reference to passenger car requirements and high-speed brakes.

The committee's recommendation of last year regarding the two beams was to adopt as standard, brake beam No. 1 for cars weighing not over 35,000 pounds light weight, and brake beam No. 2 for cars exceeding 35,000 pounds light weight. Having in mind the lowering of the test limitation the committee renews this recommendation, but will approve a slight variation in the dividing line if decided upon after debate of this recommendation.

Air Brakes, General Arrangement and Details. (Pages 559-560. Sheet M. C. B. 9.)

Recommendations covering the brake shaft for standard diameters at top and bottom and for fit of the rachet wheel, etc., would be good work for a special committee.

Proper rods and other details of foundation brake should be worked up by a special committee.

As a nipple 10 inches long is already standard, this dimension should be shown on Sheet M. C. B. 9 with a note reading: "For new cars or complete new train pipes."

When brakes are hung from the body of the car, the raising and lowering of the car, when empty or loaded, due to the action of the truck springs, seriously interferes with the brake slack, and it is impracticable to adjust the piston travel as frequently as it is necessary. This is, therefore, an undesirable standard, and reference to it should be omitted, and provision made that on cars built after a certain date it will not be permissible to hang brake beams from any portion of the body of the car.

"Size of brake chain: The committee would recommend a change of text (page 560) as follows: 'That ⅜-inch straight link chain be made standard for hand brake chain, except on cars on which there is rapid deterioration, on which 7-16-inch chain shall be used, the hand brake chain to be attached to mast by a ½-inch machine bolt instead of an eye bolt.'"

Arch Bars and Column Bolts for 80,000-Pound Capacity Cars. (Page 578. Sheet M. C. B. 22.)

The committee approves the following recommendations and suggests their reference to special committees.

That consideration be given to standard arch bars for trucks for 50,000 and 100,000 pound capacity cars.

Add to Sheet 22, journal box bolt and dimensions, and specify single nut with nut lock under head and nut of bolt; on the column bolt specify a nut lock under head of bolt on which single nut with nut lock is used. Where washer is used under head in place of nut lock, the same to be so constructed as to prevent head from turning.

The addition as recommended practice of nut locks at top and bottom of all column and journal box bolts, and discontinue the double nutting of such bolts.

That a committee be appointed to submit standard designs of arch bars and column and journal box bolts for 100,000-pound capacity trucks. The recommendation of the committee which was appointed to look into this matter several years ago failed to pass the letter ballot, and it is believed that a standard design of arch bars, column and journal box bolts is very essential on account of interchangeability, in view of most new cars being constructed of this capacity.

Siding, Roofing, Flooring and Lining. (Page 578. Sheet M. C. B. 24.)

The standards for flooring should be changed to conform to general mill practice, the widths of flooring in general use being 5¼, 7¼ and 9¼ face for both tongued and grooved and ship-lapped material. The width of the ship-lap and tongue as shown on the plate conforms to standard practice.

Sheet 24 should be revised to show separate drawings of roofing and lining, and also suggest a flooring, section 2⅜ inches thick, now in common use in cars for rough freight,

Pipe Unions. (Pages 586.)

(74) Mr. Gibbs, of the P. R. R., suggests as follows:

There should be made the necessary modification in text and table so that threads on pipe and fittings will be uniform and the taper tight, or what are known as trade line fittings, to insure the same taper on the fittings as on the pipe.

Recommended Practice.

Specifications for Woven and Combination Woven and Wrapped Air-brake Hose. (Pages 600 to 602.)

The committee approves the recommendation of the committee on "Air Brake Hose" that the specifications for woven and combination woven and wrapped air-brake hose to be submitted to the convention to be advanced to a standard.

Air Brake Appliances. (Page 602. Sheet M. C. B.—G.)

The legend should be changed to indicate that it applies only to wooden cars.

The brake staff bow is recommended, so that the half yoke or carrier iron extensions now largely used will not be applied on new cars.

Uncoupling Arrangements for M. C. B. Couplers. (Page 597, Sheet M. C. B.—B.)

Detail of bracket No. 1 on Sheet M. C. B.—B. should have the dimension 4¼ inches changed to 5¼ inches.

Minimum Thickness for Steel Tires. (Page 599. Sheet M. C. B.—A.)

The committee suggests the appointment of a special committee to prepare drawing showing limit of wear of solid rolled steel wheels to show in connection with the above, and also in the Rules of Interchange, provided this is agreeable to the "Arbitration" committee.

Safety Chains for freight cars. (Page 599. Sheet M. C. B.—A.)

The term "Permanent Safety Chains for Freight Cars" should be changed to read "Permanent Safety Chains for Wooden Underframe Freight Cars." Also on same sheet, the term "Permanent Safety Chains for Steel Cars" should be changed to read "Permanent Safety Chains for Steel and Steel Underframe Freight Cars."

*Abstract of report presented at the annual convention of the Master Car Builders' Association at Atlantic City, N. J., June, 1908, by a committee consisting of T. S. Lloyd, J. E. Buker, T. M. Ramsdell, W. C. A. Henry and G. H. Gilman.

Collection of Salt Water Drippings. (Page 607. Sheet M. C. B.—A.)

The committee is of the opinion that the present Recommended Practice on this subject is not being followed very closely, and that track and bridges are still being damaged by brine dripping from refrigerator cars. It is suggested that a special committee be appointed to review this Recommended Practice with a view of presenting a revision that will be acceptable.

BRAKE SHOES.*

1. **Frictional Qualities of Shoes Submitted by Railway Companies.**—The committee on "Tests of Brake Shoes," would report that during the past year five shoes have been submitted by railway companies. Four were sent by J. F. Walsh, representing the Chesapeake & Ohio, and one was sent by William Garstang, representing the Cleveland Cincinnati Chicago & St. Louis. These shoes were tested for frictional qualities under the specifications of the association. C. & O. shoes were tested upon a cast-iron wheel only, while the C. C. C. & St. L. shoe was tested upon a cast-iron and a steel-tired wheel. Three of the five shoes tested upon a cast-iron wheel more than met all the requirements of the association's specifications; two failed to do so. The one shoe tested upon a steel-tired wheel proved satisfactory so far as the mean coefficient of friction is concerned, but developed an abnormally high rise in the coefficient of friction at the end of the stop. [The description of these shoes and a detailed statement of results obtained from them were presented as Appendix I of the report.—Eds.]

2. **Wearing Qualities of Shoes Submitted by Railway Companies.**—The four shoes submitted by Mr. Walsh were subjected to a wearing test under a programme similar to that employed by your committee in its preliminary investigations which were reported last year. [An outline of the method employed and a statement of the results obtained from these shoes constitute a part of Appendix I already referred to.—Eds.] In reporting these results, the committee reminds the association that as yet there is no specification governing tests of wearing qualities. The significance of the data must be judged in the light of the more elaborate discussion of tests to determine wearing qualities, which follows:

3. **A Review of the Work of Past Years.**—It will be remembered that the association has definite specifications covering the frictional qualities of brake shoes, and that the work of the committee, during recent years, has been confined to testing shoes under these specifications. The effect of this work has been to stimulate interest in the brake-shoe problem, and to make of record information concerning the action of shoes on both cast-iron and steel wheels. The fact that your committee has reported that most shoes recently tested have met the requirements of the association's specifications, may be accepted as evidence that its work has been effective in improving the friction of shoes sold to railway companies. Two years ago your committee called attention to the need of information concerning the wearing qualities of brake shoes, and under authorization from the executive committee, initial steps were taken to establish tests which would serve as a measure of wear. Proceeding, your committee's report of last year was devoted almost exclusively to a discussion of methods and to the presentation of results obtained from fifteen different shoes when exposed to wear under a definite programme. The results, which were obtained by exposing the shoe to wear under a single set of conditions only, showed great variation in the wearing qualities of the several shoes tested. In presenting them, their value as a measure was frankly questioned as will be seen from the following quotation: "Whether the relative results would be the same had the conditions of test involved lighter pressure or higher speeds than those which were actually employed, is a question which the committee has not yet had time to determine. It is not impossible that a shoe giving a relatively poor performance under the conditions of the test, would show relatively better under some other conditions. If, for example, shoes are designed for specified service, it would perhaps be unfair to expect all to show at their best under a single condition of operation." The purpose of your committee during the present year has been to throw light upon the question raised by the statements quoted. To this end arrangements were entered into with the authorities of Purdue University to extend the work along the lines of last year's investigations. Out of the 15 shoes dealt with in last year's report, there were nine presenting sufficient material to serve under the programme of the present year. These shoes are described and illustrated in the report of last year. A summary of their description is given herewith as Table I.

[To perfect the record and especially in response to suggestions made upon the floor of the convention last year, your committee presented as Appendix III, a statement of the chemical composition of the shoes worked upon this year.—Eds.]

Table I—Shoes Tested.

No.	Road	Markings	Material
158	Hock. Val.	Streeter	Soft iron with hard insert.
161	Hock. Val.	Diamond S	Soft iron with hard insert.
163	A. T. & S. F.	B X V-36	Hard iron with hard corrugated insert.
172	A. T. & S. F.	G-79-B	Soft iron with seven hard circular inserts.
179	W. & L. E.	Pittsburg	Malleable iron back, composition filler.
183	D. M. & N.	———	Pressed steel back, composition filler.
194	L. S. & M. S.	C. & N. W. 8386	Medium hard cast iron with seven hard rectangular inserts.
200	L. S. & M. S.	Streeter	Soft iron with hard insert.
205	L. S. & M. S.	P. C. P. G. 3960	Soft iron with no insert.

Note—The term soft as here used applies to iron which can be drilled easily.

4. **The Schedule of Tests.**—Each of the nine shoes described have been tested both upon a cast-iron wheel and upon a steel-tired wheel; first, when applied under a lighter pressure than that employed last year, and second, when applied under a heavier pressure than that employed last year. Also since the tests last year were upon cast-iron wheels only, the programme of that year has been repeated upon the steel-tired wheel. In the actual working out of the programme, each shoe was tested under a normal pressure of 1,080 pounds and 4,152 pounds on a cast-iron wheel, and under pressures of 1,080, 2,808, and 4,152 pounds on a steel-tired wheel. The cycle, as controlled by Gear B, was used for the tests under pressures of 1,080 and 2,808 pounds, and that, as controlled by Gear A, was used for the heaviest pressure, 4,152 pounds, this change being necessary to give the shoe sufficient time to cool between applications. When the cycle is controlled by Gear A, the shoe is in contact with the wheel during 150 revolutions, and is out of contact during the succeeding 1,450 revolutions, the shoe being applied once during each 1,600 revolutions of the wheel. When the cycle is controlled by Gear B, the shoe is in contact with the wheel during 190 revolutions, and is out of contact during the succeeding 610 revolutions, the shoe being applied once for each 800 revolutions of the wheel. The speed in all cases was equivalent to 20 miles an hour.

[A detailed description of the methods and of the results was given in the report submitted by the authorities of Purdue University, constituting Appendix II of this report.—Eds.]

[A graphical summary of the results is given in the accompanying diagrams, wherein the figures along the bottom are the laboratory numbers of the shoes, and the figures at the left show the number of pounds loss in weight per 100,000,000 foot-pounds of work absorbed.—Eds.]

5. **Conclusions Concerning Wearing Qualities:**

(a) The shoes tested present great variation in the wearing qualities, the ratio between the poorest and the best shoe being as great as one to four.

(b) The relative resistance to wear exhibited by different shoes is somewhat affected by the severity of the application. Of a series of shoes, the one which suffers least from wear at light pressures may not be the one which suffers least under a heavy pressure. Variations of this sort are, however, of small value, and if standards of performance are not too minutely defined, they may be neglected.

(c) Within limits employed by the committee, whatever may be the pressure, the results clearly distinguish between the slow wearing and the rapid wearing shoe.

(d) All shoes tested wear more rapidly on a steel-tired wheel than on a cast-iron wheel. In general terms it may be said that for the absorption of a given amount of work, the wear upon steel-tired wheels is twice as rapid as upon cast-iron wheels.

(e) The results attest the value of the insert shoe. The work of this year was chiefly confined to shoes of this type because the solid shoes had been worn out by the tests to which the series had previously been subjected. (For facts concerning solid shoes, see report of 1907.)

(f) It is noteworthy that the four shoes showing least wear, 158, 163, 194 and 200, on both steel and cast-iron wheels, are all insert shoes, and that all practically meet the asso-

*Abstract of a report presented at the annual convention of the Master Car Builders' Association at Atlantic City, N. J., June, 1908, by a committee consisting of W. F. M. Goss, George L. West and B. D. Lockwood.

ciation's specifications as to frictional qualities. (For statement of frictional qualities, see report of 1906.)

6. **Concerning Limits of Allowable Rate of Wear in Brake Shoes.**—It is not the purpose of your committee to attempt at this time to frame a specification governing the wearing qualities of brake shoes, though the data presented seems to supply a satisfactory basis for such a procedure. We suggest, however, as a matter for further deliberation, the following qualifications:

(a) That tests designed to determine the wearing qualities of brake shoes be run under a constant brake shoe pressure of 2,808 pounds.

(b) That the cycle of operation be 1,600 revolutions, 150 revolutions being with the shoe in contact with the wheel, and 1,450 being with the shoe in release.

(c) That the peripheral speed of the test wheel be 20 miles an hour.

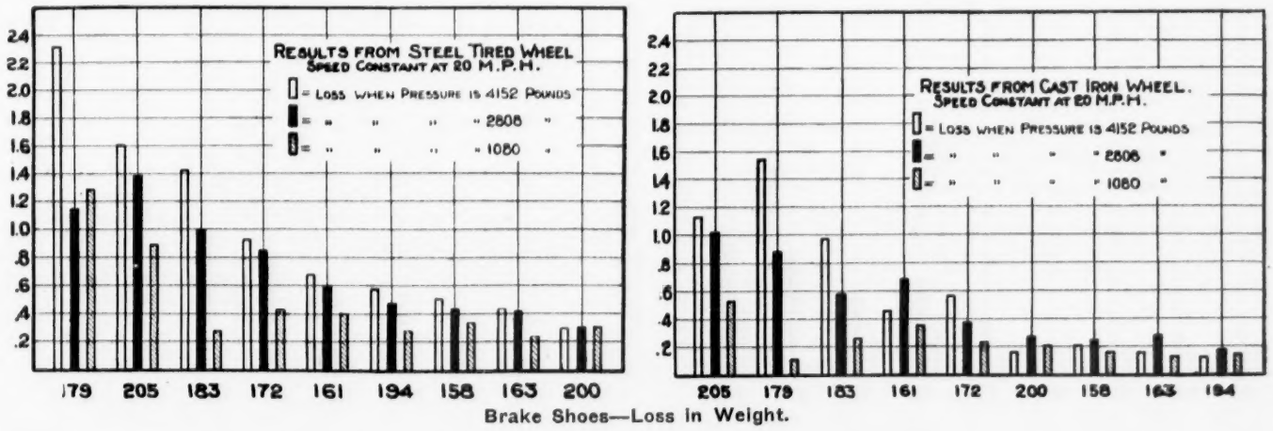
(d) That under the conditions stated, a shoe should develop for each pound of metal worn away, 350,000,000 foot-pounds of work in contact with a cast-iron wheel and 200,000,000 foot-pounds of work in contact with a steel-tired wheel.

A specification framed along these lines would pass four out of the nine shoes tested for service on both cast-iron and steel-tired wheels.

7. **Future Work.**—Your committee believes that the work of the present year leaves two questions open which should be settled beyond doubt before a specification governing wearing qualities should be adopted. These are: (1) A confirmation of the general conclusions based upon the work of the present year; and (2) investigations which will disclose the effect of different brake shoes upon the wheel. With reference to the confirmation of the results of the present year, it would seem wise that not less than fifteen newly selected representative shoes be tested, the program of operation being identical with that employed this year. The results of such tests added to those now available would give a volume of data sufficient to permit limits to be set defining performance, which would be safe and reasonable. The importance of determining the effect of the shoe upon the wheel becomes apparent when one considers the possibility of a shoe showing a high resistance to wear, which may, in fact, be protected at the expense of wear upon the wheels. In discussing this matter last year, your committee expressed its regret "that no measure has yet been made which will disclose the wear of the wheel under the influence of the shoe." To secure such a measure it will be necessary to have a balance of sufficient capacity to weigh the wheel and of such delicacy as to indicate differences of weight as small as 1-500 part of a pound. No such balance is now available at the laboratory.

8. **Acknowledgments.**—The committee acknowledges the interest taken in its work by Prof. C. H. Benjamin, dean of the schools of engineering of Purdue University, by Prof. L. E. Endsley of that institution, who has been concerned with the immediate supervision of the work of the laboratory, and by the Griffin Wheel Company, represented by the vice-president and secretary, George F. Griffin, who, responding to the request of the chairman of the "Brake Shoe" committee, generously consented to make, without cost, analysis of such samples of brake shoe material as might be submitted to them by your committee.

The Central Inspection Bureau, No. 17 State street, New York, has the contract for inspecting a large number of cross ties for the Philadelphia Rapid Transit Company.



Brake Shoes—Loss in Weight.

TESTS OF M. C. B. COUPLERS.*

Uncoupling Attachment.

The executive committee referred the following subject to the standing committee on "Tests of M. C. B. Couplers:" "The investigation of the cause of broken links and clevises, bent uncoupling rods, and to submit a design of uncoupling rod to obviate these troubles." To further this investigation a circular was sent out containing the following questions, to which are attached the substance of the replies from 51 roads representing 1,120,000 cars.

(1) Causes of broken links and clevises?

From excessive slack in draft rigging	41
" improper or light material	23
" short chain	18
" long chains caught behind coupler horn	13
" improper repairs	10
" shifting loads	7
From kinked chain	2
" couplers not provided with lock-set	1
" couplers of unequal height	1
" lock pin inoperative	1

(2) Causes of bent uncoupling rods?

From excessive slack in draft rigging	32
" shifting loads	21
" short chain	12
" rough handling	9
" cars cornered	8
" push pole slipping	7
" improper material or repairs	5
" other causes	11

(3) Are these failures more prominent on wooden cars or steel cars?

Wooden cars	42
Same on wooden and metal cars	7
Steel cars	5
No answer	4

(4) Are these failures more prominent on cars equipped with spring or friction draft gear, and if so, on what specific type?

On spring gears	30
No difference noted	14
Single spring	11
American continuous	9
Friction gears	5
No friction gears used	2
Stem attachment	1

(5) Style and description of uncoupling arrangement with which most trouble is experienced and wherein the specific trouble lies?

M. C. B. type	17
Some trouble with all	14
Special devices	8
Weal links and brackets	5
All arrangements with bracket on deadwood	4
Chain dropping in lock hole	3
With couplers lock-setting on bracket	2
On cars subject to shifting loads	1
Center bracket not slotted	1
Attached by lag screws	1
Open link chain and clevis	1

*Abstract of a report presented at the annual convention of the Master Car Builders' Association at Atlantic City, N. J., June, 1908, by a committee consisting of R. N. Durborow, G. W. Wildin, F. W. Brazier, T. H. Curtis and F. H. Stark.

(6) To what extent is freight equipment used in passenger service and what provision is made to prevent the buffer on the passenger car interfering with the uncoupling arrangement on the freight car?

No provision made, no difficulty	15
Not used in passenger service	11
Buffers removed	10
Special devices	5
No answer	4
Freight coupler used on passenger car	2
Protected by buffers on freight cars	1

(7) What form of release arrangement is preferred by the trainmen?

Double ended	11
Special devices	11
M. C. B. type	8
No decided perference	8
Straight outward pull	3
Side or under	1

(8) What form of universal release rigging is recommended to suit all types of M. C. B. standard couplers?

Special devices	22
No answer	13
M. C. B. type	12
None to recommend	7
Double ended	5
Outward pull chain	1
Side release	1

An examination was made of several thousand uncoupling attachments and a careful and detailed investigation of 1,764 of this number as regards design, application, condition, maintenance, repairs and operation. This was conducted on five railroad systems, and as both foreign and home cars were inspected it covers practically all classes of cars offered in interchange, as well as all kinds of attachments. Four main styles of uncoupling attachments for M. C. B. couplers are found, namely, single-end rods on concealed end sill cars, single-end rods fastened to front of end sill on projecting end sill cars, single-end rods fastened on top of end sill close to body on projecting end sill cars and double-ended rods. The general design, application and maintenance of some uncoupling attachments is not altogether satisfactory, for example, 22 per cent of the rods will not operate the coupler knuckle throw, and 11 per cent will not raise the lock to the lock-set position, 18 per cent have uncoupling rods with center arm only three to six inches long, and 17 per cent have a chain slack as much as from three to seven inches; split links and S hooks combined average 12 per cent; more than one-half of the brackets are applied with lag screws instead of bolts and 71 per cent of the links and 74 per cent of the clevises are of smaller size than the recommended practice, which calls for ⅝-inch links and clevises. The style of rod fastened to front of end sill is the least efficient, while, in general, the single-end rod on concealed end sill cars and the single-end rod on back of end sills give better service. A large number of uncoupling attachments were found having loose lag screws, rods binding on brake staffs, retainer pipes, ends of car, etc., and with the handle improperly located.

Excessive slack in draft rigging is largely responsible for broken links and clevises and for bent rods, but this condition is seldom found on steel and steel underframe cars equipped with high capacity spring or friction draft gears. It is found largely in the older and lighter equipment having wooden draft arms with single springs and three-bolt draft stops bolted to side of draft timbers and not gained into same, which are not maintained in proper repairs for service under varying conditions. Often this equipment is perfectly suited to run on the home road in light trains, but, when away from home at the head of trains hauled by two or more heavy locomotives over heavy grades, is not equal to the service and results in loosening up of the draft gears and consequent breaking of chain or bending rods.

In this connection it should be noted that the release rigging on these older cars is designed for use with the couplers without lock-set in the coupler head, but lock-setting was accomplished by supporting the release rod on a shelf provided on the end bracket, which required a neat adjustment of chain. This design worked out very well for the couplers in use during that period when chains had sufficient slack, as the draft arrangements were adequate for the weight of train handled. Now, however, these same cars are having the modern lock-setting and knuckle throwing types of couplers applied, requiring as much as six inches lift, using the same length arm on rod and same chain connection which was used when springs were subjected to 25,000 pounds pull. Whereas, now, two engines are frequently used exerting a tractive force of from 70,000 to 80,000 pounds, while the stresses in trains due to rough handling have been accurately measured and found sometimes to exceed 600,000 pounds. This condition is bad enough in the type of draft rigging noted, but the worst conditions are present on cars equipped with the American continuous draft gear. There are now, however, relatively few of the latter in service and these are being replaced with improved types of draft gears.

On some of the older types of couplers the lock does not operate in a central vertical plane and the rod should be changed when an M. C. B. standard is applied, but this is not often done and the old rod causes certain difficulties in the operation of the coupler. On box cars with concealed end sills the uncoupling rod is liable to be made inoperative when the end of car is forced outward; on all forms of uncoupling rods, and particularly double-ended rods requiring more than two bearings, this trouble is rather pronounced, and is aggravated by often using such brackets that place the rod close to the siding so that slight bulging of the end interferes with the operation of the rod. Proper care is not taken to offset or locate rods a sufficient distance from brake staff, retainer pipe, end posts, etc., to provide the necessary clearance for operation. Occasionally bends made to clear these obstructions allow insufficient movement of rod to properly throw the knuckle. Double-ended release is preferred by some; however, it is a fact that these double rods are frequently bent and are liable to become totally inoperative. Bent rods, attributed to shifting loads, are frequently damaged by coming in contact with rods on coupled cars when the slack in the train is bunched. Rods with long center arms located on face of end sill, with draft gear in release position, on which the eye of rod is more than two inches ahead of eye of coupler lock are liable to interfere when coupler horn is against striking plate, especially when draft attachments and end sills are in a worn condition. A rod with the handle on the side of car is undesirable on account of interference with the use of the sill step and its liability to become bent or broken in such an exposed position.

The design and attachment of brackets have an important influence on the operation of the uncoupling attachment. The usual brackets allowing but little play to the rod are a source of inoperative uncoupling attachments. The committee believes that the best form of center bracket is one having a slot which gives the rod about three and one-half inches longitudinal travel and is attached to the car by bolts. The outside bracket on wooden cars is generally attached by lag screws and, as it is usually necessary to remove these lags to straighten bent rods, it is felt that bolts are preferable. There are two or three brackets on the market allowing the rod to be removed without removing the bracket itself, which is a good feature, especially for yard repairs. On steel equipment the brackets are usually attached by bolts and no trouble is experienced. Occasionally they are attached by rivets, which is undesirable, because it is either necessary to streighten the rod on the car or to cut off the rivets, unless the brackets are of that type mentioned above.

Short chains are not confined to the old wooden cars but are seen frequently on steel and steel underframe cars of modern construction. One reason for this is that the coupler manufacturers usually provide a chain of fixed length which is being used for all designs of rods and car end constructions, instead of arranging the length of chain with reference to the end construction, type of rod used, travel of gear, etc. This defect is noted more frequently on cars equipped with couplers having the floating type of lock, which are generally provided with a chain so that a clevis only is necessary to connect the lock to the rod. This difficulty has been avoided in some instances by using an extra clevis or a clevis provided with two holes. It is recommended that these chains must have an eyelet above locking-pin hole so that the recommended links and clevises can be used. This should avoid the use of split links and "S" hooks.

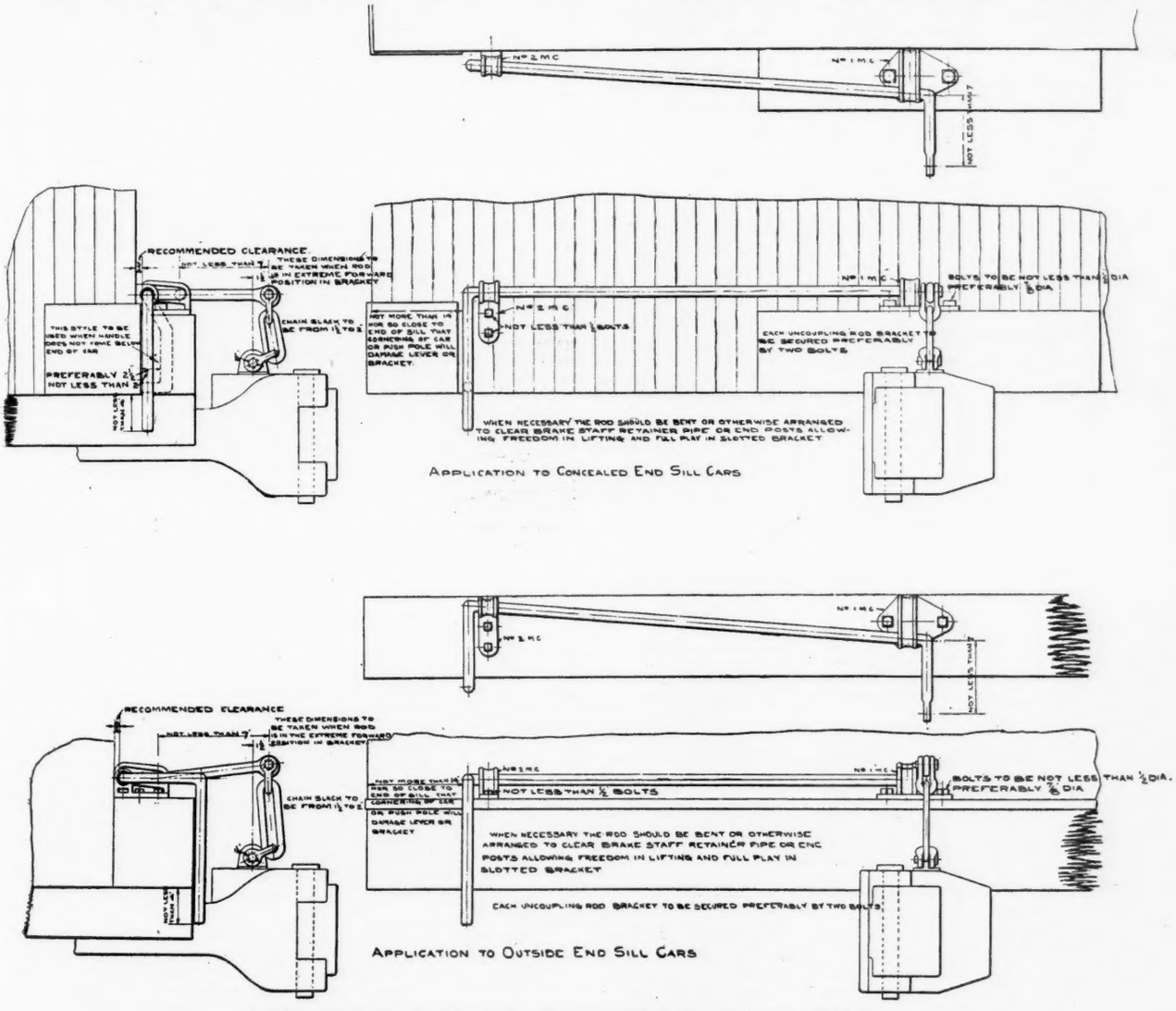
"Kinked chain" is a defect usually found on the floating lock type of couplers, the links wedging in coupler head so that repeated jerking on the rod fails to dislodge them, making adjustment necessary. Insufficient attention is given to this matter, and it is felt that, were the links for this purpose secured and well-fitted to locks, less trouble would be experienced. Couplers having a long single-piece lock require close adjustment of uncoupling attachment to prevent binding and consequent heavy duty on the release rod and chain. The use of a large number of links of small chain should be discouraged, as they break easily, and when one link breaks it is usually replaced by an S hook or split link. It follows that the best practice is the use of two heavy malleable iron clevises cored for ¾-inch pins connected by a single heavy wrought iron or malleable link.

Improper or light material both in original construction and in repairs is a large factor in the increased number of bent uncoupling rods and of broken links and clevises; the use of split links and S hooks instead of clevises and bolts

instead of pins, contributes to a large number of failures. There is little excuse for these practices on the shop tracks and in the yards; such points should be provided with a supply of standard links, clevises and pins to insure cars being repaired with standard material. Attention is directed to the fact that certain coupler companies are furnishing clevises which use the ½-inch instead of the recommended ¾-inch pin. The use of bolts should be discouraged, as the nut works off, making the uncoupling attachment inoperative. Large cotter pins are also used instead of the recommended ¾-inch pins.

There are other causes for bent rods and broken links, and clevises, many of which are not chargeable to design or maintenance of uncoupling attachment but solely due to carelessness of those handling cars. Cars cornering in yards lack of proper attention to maintenance after application. It is believed that for all classes of cars and for all couplers which come under the M. C. B. standards a single ended rod properly designed is the most suitable arrangement not covered by patents that can be used. Acting on this, changes are suggested in M. C. B. Sheet B, which it is thought will overcome the defects in design and reduce to a minimum the troubles incident to improper maintenance.

The special feature of this uncoupling attachment is the slotted center bracket, which has been in use on a number of roads for some time, and very few cases of bent rods, etc., are found on cars so equipped. By placing the rod back on top of the end sill or head block a longer arm is obtained, which gives sufficient lift with ample slack in the chain, and by using a sloping slotted bracket the rod projects 1½ inches


No 2 M C
No 1 M C
NOT LESS THAN 7
RECOMMENDED CLEARANCE
NOT LESS THAN 7
THESE DIMENSIONS TO BE TAKEN WHEN ROD IS IN EXTREME FORWARD POSITION IN BRACKET
THIS STYLE TO BE USED WHEN HANDLE DOES NOT PROJECT BELOW END OF CAR
CHAIN SLACK TO BE FROM 1½ TO 2
PREFERABLY 2½ NOT LESS THAN 2
NOT MORE THAN 10 NOR SO CLOSE TO END OF SILL THAT CORNERING OF CAR OR PUSH POLE WILL DAMAGE LEVER OR BRACKET
NOT LESS THAN ½ BOLTS
BOLTS TO BE NOT LESS THAN ½ DIA PREFERABLY ⅝ DIA
EACH UNCOUPLING ROD BRACKET TO BE SECURED PREFERABLY BY TWO BOLTS
WHEN NECESSARY THE ROD SHOULD BE BENT OR OTHERWISE ARRANGED TO CLEAR BRAKE STAFF RETAINER PIPE OR END POSTS ALLOWING FREEDOM IN LIFTING AND FULL PLAY IN SLOTTED BRACKET
APPLICATION TO CONCEALED END SILL CARS
No 1 M C
No 2 M C
NOT LESS THAN 7
RECOMMENDED CLEARANCE
NOT LESS THAN 7
THESE DIMENSIONS TO BE TAKEN WHEN ROD IS IN THE EXTREME FORWARD POSITION IN BRACKET
CHAIN SLACK TO BE FROM 1½ TO 2
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WHEN NECESSARY THE ROD SHOULD BE BENT OR OTHERWISE ARRANGED TO CLEAR BRAKE STAFF RETAINER PIPE OR END POSTS ALLOWING FREEDOM IN LIFTING AND FULL PLAY IN SLOTTED BRACKET
EACH UNCOUPLING ROD BRACKET TO BE SECURED PREFERABLY BY TWO BOLTS
APPLICATION TO OUTSIDE END SILL CARS

Tests of M. C. B. Couplers—Recommended Uncoupling Attachment.

is the cause for a great many bent rods, as is also the careless use of push poles.

From the answers received there is apparently little trouble from the buffers of passenger equipment making uncoupling attachment of freight equipment inoperative when these two classes of cars are coupled. It is not the practice on many roads to run freight equipment cars in main line passenger service, but where this is done, either the buffers are removed, or some special release device is used. The use of the two classes of equipment together is largely confined to branches where the passenger equipment is of the older type, and, having the two circular buffers, little difficulty is found in the way of interference.

It is the belief of the committee that considerable trouble from inoperative attachments is due, first, to not taking into consideration, when designing, all the various elements necessary for efficiency in operation and repairs; and second, to a in front of coupler lock, which is about the best position for an efficient lift. The slotted bracket allows the rod to slide back 3½ inches and avoids interference when slack of train is bunched.

The handle shown should preferably project below the end of the car or be bent as shown by dotted lines in order to protect the operator's hand.

The present Recommended Practice Sheet B, shows a chain 8½ inches long with one 5¾-inch link; the proposed recommended practice shows two additional links 3¾ inches and 7¾ inches long, respectively. By using one of these three links, therefore, a chain 6½, 8½ or 10½ inches long is obtained, which should fit all cars and M. C. B. couplers. These links should avoid the use of split links, S hooks and other temporary repair devices now very common. The arrangement, as a whole, is applicable to all types of cars, and if properly applied will largely obviate present troubles. Only

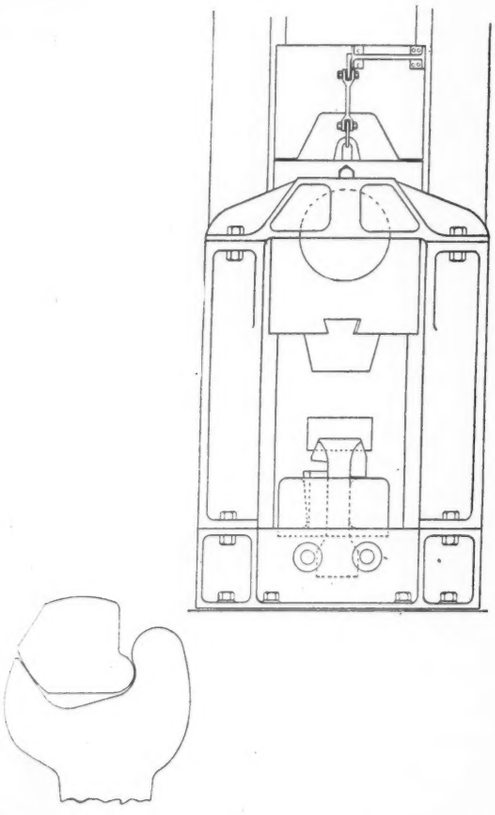
a few limiting dimensions are shown on the drawing as the others must be adapted to each particular class of car; but the dimensions for center arm, chain slack and position of lift pin eye should be carefully adhered to.

It is believed to be inadvisable to open the specifications to admit the use of side or bottom operated couplers until such time as the merits of either one of these can be recommended in place of the present standard, but in order to ascertain the availability of these proposed devices, the committee would suggest that they be given an extended trial by different railroads on cars of their own equipment, preferably on those not offered in interchange.

Operation and Condition of Couplers.

With a view of obtaining definite information relative to the operation and condition of couplers in service, your committee made an investigation of about 50 each of the 10 most prominent types.

For "Average distance from point of knuckle to guard arm," three types average 4 15-16 inches, only 3-16 inch from



Tests of M. C. B. Couplers—Proposed Face Test.

the 5⅛-inch M. C. B. worn coupler limit. This is mostly due, on No. 4 coupler, to excessive wear on the knuckle tail and lock bearing; on No. 8, to worn pivot pin holes, and on No. 25, to improper fitting of the new couplers. Many of the latter are found measuring 4⅞ inches to 5 inches when new, indicating clearly that they were not inspected in accordance with the specifications of the association.

The knuckle-throwing feature of most couplers is very unsatisfactory; it was found inoperative in 27 per cent of all knuckle-throwing couplers, and 61 per cent on one make. The inclined plane type of knuckle-throw used on several types of couplers works fairly well on new couplers, but after service the engaging surfaces on the lock and knuckle tail become flattened, resulting in an inoperative knuckle throw. Possibly an improvement could be made by having the lock engage bottom of inclined plane farther away from the edge nearer the pivot pin side. A steeper incline would also probably help the matter, but this may make the lift of the locking pin excessive. Some couplers now require from 6 inches to 6½ inches lock lift to throw the knuckle, which is too much for many types of uncoupling attachments with which the cars are now equipped. To prevent couplers from having an excessive lock lift, which would further complicate the uncoupling question, the committee recommends that the lock lift shall not be more than 6 inches. Failure to knuckle-throw is also due on some types of couplers to the chain becoming kinked or bent inside the coupler head. The coupler having highest per cent of knuckle-throw inoperative has a spring to throw the knuckle, and from observation it would appear that springs have no place in a freight car coupler. The committee feels that the manufacturers should improve the knuckle-throw, as it is a recommended practice of the association and should be advanced to standard as soon as couplers can be made that are satisfactory in this respect.

As to the lock-set most modern couplers are fairly satisfactory, the one coupler having high percentage inoperative is no longer made.

The knuckle tail and lock bearing should be so located that the bearing will be central in relation to the horizontal center line of coupler and of sufficient area to avoid excessive wear, and both the lock and knuckle tail should be substantially backed up by the wall of the bar to stand the heavy service to which couplers are now subjected, and to reduce the large number of lock and knuckle renewals. Improper wear of these parts is also caused by pivot pins smaller than standard to coupler being applied on repair tracks and on the road. This results in undue wear and distortion of contour lines and allows the knuckle to open slightly, resulting in the knuckle tail not bearing squarely on the lock.

Some pins now furnished easily become worn, shouldered and bent, and a large number are renewed for these defects. These pins would undoubtedly fail were they tested in accordance with the association's recommended practice for test of knuckle pins, and the committee urges the members to specify this test in purchasing all pivot pins.

The pivot pin hole worn is found on all couplers after they have been in service some time, but in some makes the wear is more rapid than in others, and proper design and fitting as well as thorough broaching of knuckles and lugs will prevent this wear becoming excessive. The knuckle should be designed and fitted so as to prevent strain on the pivot pin in buffing. The pivot pin hole throughout should be smooth, the surface should be as hard as possible, and the pin should have a driving fit in the lugs. Attention is also directed to the poor broaching of some types of knuckles and bars, in that this broaching removes only the cores and some of the sand and leaves the holes in a rough, out-of-round, and worn-out condition, so that the pin is easily bent and worn; this also interferes with the knuckle-throwing properties. This broaching to be effective should be done by power hammer or similar method to insure removing all projections and form a true and smooth hole.

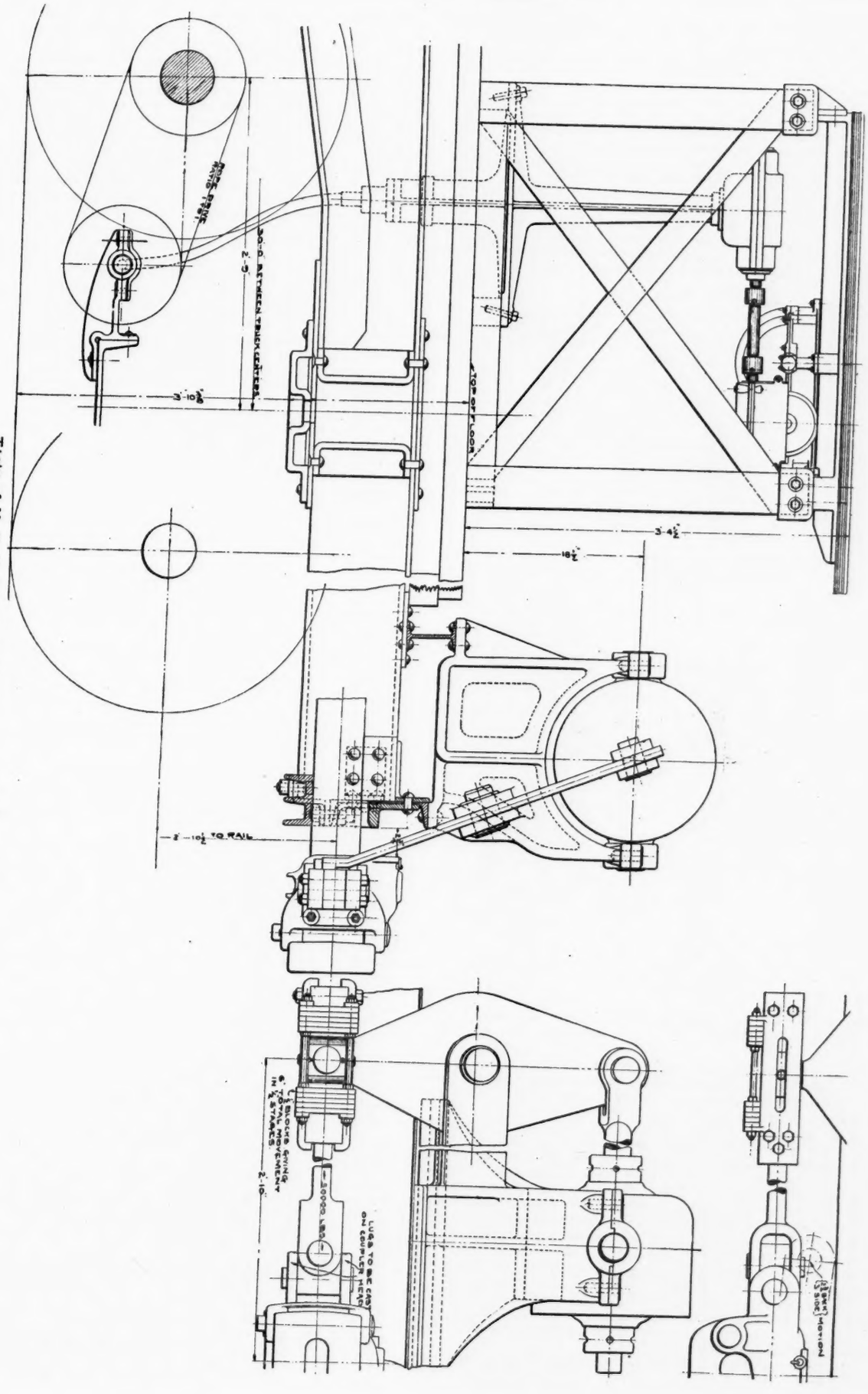
Bent or broken locks are more frequent on couplers having the long one-piece lock. These become bent, both above and below the coupler head, by striking truss rod nuts on some classes of cars, carrier irons and other obstructions, which render the knuckles inoperative.

It has developed that when some of the coupler manufacturers changed the contour lines of the couplers in accordance with the standards of the association, they neglected to fill in the lines of the knuckles contour sufficiently to coincide with the new lines of the bar when knuckle is closed. This prevents the point of the mating knuckle engaging the knuckle tail continuously until the lock drops. Another item entering into the mating of couplers is the failure of some coupler knuckles giving a full opening. The point of knuckle should be in a line with the inside of the lugs on bar, which line should be parallel with the longitudinal center line of coupler.

Although the 1907 coupler report showed conclusively that the weakest point in the coupler is through the face into the locking pin hole the present specifications call for no test which shows up weakness at the face, and as this is the part of the coupler most frequently failing in service, it is believed that the specifications should contain a face test. With this in view experiments have been made with a number of devices, and the wedging block shown in one of the accompanying engravings has so far been found satisfactory for the purpose. The committee intends to make further trials with a view to late incorporating this test in the specifications, provided that after extended use no objections present themselves and in this event it may be possible to eliminate the present guard-arm test. Meanwhile the manufacturers should do all in their power to strengthen this weak part in present couplers and should design all new types with a view to eliminating these failures.

The question has been raised as to what should be done in regard to the stamping of couplers in case a railroad has no test and inspection facilities. The committee, after carefully considering the matter, has reached the following conclusion, which has been sanctioned by the executive committee: Coupler manufacturers shall themselves be allowed to inspect and test their couplers in accordance with the

Tests of M. C. B. Couplers—Mechanism for Testing Side Thrust.

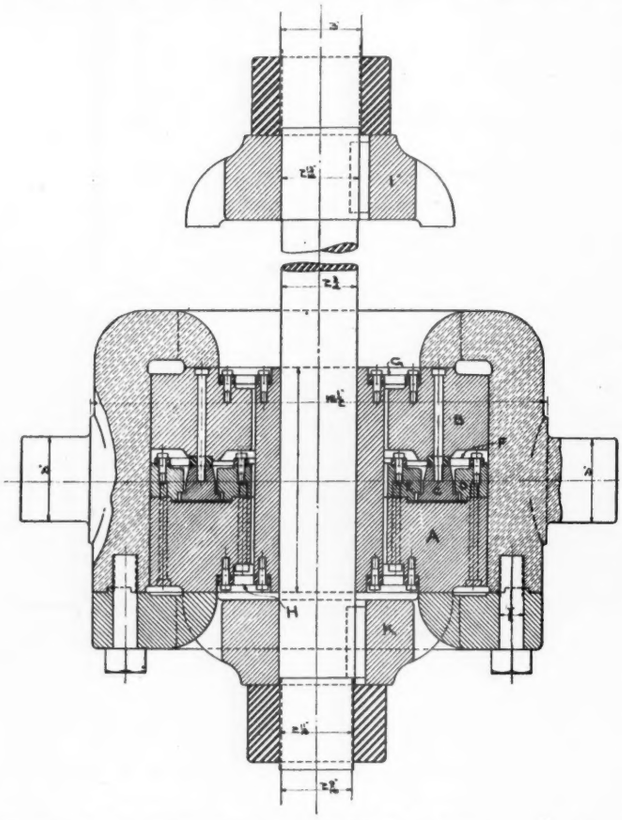


M. C. B. specifications, for such railroads as may elect to have the coupler manufacturers do this work for them, with the proviso, that after the prescribed inspection and tests have been made, each coupler and knuckle must be stamped with the letters "M. C. B." with a prefix or addition indicating that the inspection and tests have been made by the manufacturer. This may either be the manufacturer's trade mark or some other designating mark, either of which must be filed with the association. The committee does not consider it necessary to incorporate the above in the coupler specifications as it is simply an interpretation of an existing clause.

The committee wishes again to call attention to the continued use of malleable iron couplers. A malleable iron coupler is in no sense an M. C. B. standard, and its application should be discontinued on cars offered in interchange, as its strength is insufficient to withstand the service to which couplers are subjected on most roads.

Friction Draft Gear.

The executive committee requested the committee to recommend a standard maximum capacity for friction draft gears, and the most desirable resistance during each ⅛-inch compression, also to report on the value of friction draft



Tests of M. C. B. Couplers—50,000-Pound Dynamometer—Proposed Hydraulic Support.

gear in reducing damage to cars and their contents. To secure data on the subject, there was referred to the members a circular of inquiry. Replies were received from 53 railroads, operating 904,000 cars.

The replies in general seem to be based on the capacity of the gears now on the market, a decided preference being expressed for a capacity of about 150,000 pounds. At present the better types of spring gears have a capacity of about 60,000 pounds, and absorb practically no work, the compression being sent back into the train as recoil. The ordinary pulling and buffing forces when train is in motion do not usually exceed 40,000 pounds when train is handled by one engine, but there are shocks due to engines coupling on trains, yard switching, etc., which are of frequent occurrence and often exceed 100,000 pounds. When there is a lack of attention in gravity yards and brake maintenance and operation is faulty, stresses of 600,000 pounds have been exceeded, and on road brake tests with the maximum poor conditions stresses of 500,000 pounds have been recorded.

In general the car framing, draft gear and attachments should be considered not only for the home road but also with reference to conditions on roads with which the cars will be interchanged. In case cars are subjected to small stresses, a low-capacity draft gear equal to these stresses is more satisfactory than a high-capacity gear of same travel, as in the latter case there will be more shock transmitted to the car framing, because the small shock is taken up in a short travel in the high-capacity gear. From these considerations 150,000 pounds seems to be a desirable capacity for general service where cars of all types are made up in the same train. Roads handling heavy trains of steel cars loaded with coal, ore, etc., and not interchanging these cars, may find it advantageous to use gears having a capacity of 300,000 pounds or more with the present travel, as experience has shown that on the better class of modern steel cars the attachments are amply strong and the car framing is sufficient in strength to stand severe shocks. It would be expedient to make equipment wreck proof, when there is still much to be accomplished in the improvement of braking conditions, such as better maintenance of the brake apparatus and more careful handling by the train crews.

The distribution of work in the friction draft gear is a more important factor than the maximum capacity, for it has been shown by tests that with two gears, one of which has a much higher capacity than the other, the first by reason of its distribution of work transmits more shock to the car framing than does the second, the maximum capacity of the first being 50 per cent. greater than the second. As has been previously stated, the vast majority of the shocks in the train when brake equipment is in good condition and properly handled are not much more than the maximum tractive power of the engine, which on an average is about 40,000 pounds. From this it follows that a friction draft gear should have a capacity of 30,000 to 40,000 pounds in the first 1 to 1½-inch travel, and then the capacity should be increased to a maximum which with present travel it is believed should be from 150,000 to 200,000 pounds. Experience has shown that with much more capacity than the above with the present travel the transition from the preliminary spring action to the frictional operation is not smooth, and transmits severe shocks to the attachments and car framing. Therefore, the results from gears of 300,000 pounds capacity are often less satisfactory than those having 150,000 pounds, assuming the diagrams similar in relation to release.

In this respect, providing there is smooth action in the compression, the friction gear has a unique advantage due to the absence of large recoil, the work being absorbed in the heating and wearing of the friction surfaces instead of being returned to the train, as in the case with spring gears. However, there should be sufficient recoil to release the gears promptly, as some gears have been found jammed and failing to release.

The advocates of increased travel should consider that 150,000 pounds capacity is in general sufficient with the present travel when the gear is satisfactorily designed, in view of the fact that the majority of cars with which they run have draft gears of only 60,000 pounds capacity.

The reduction in damage to cars and contents by the use of friction and other improved draft gears is one on which little definite information is available, for the improved draft gears have generally been placed on cars of stronger underframe construction and with heavier attachments for the draft gear. A number of lines, when rebuilding old equipment, have used the stronger draft gear, and so were able to form an opinion on the resulting benefit due to the newer construction. Again, some roads have constructed large numbers of cars and applied different draft gears to the same lot of cars, and from the repair costs were able to determine with considerable accuracy the efficiency of one type of gear over another in reducing damage to cars and contents in the yards and on the road. Nevertheless, the full value of the improved draft gear is not always apparent, for, together with their introduction, conditions have developed in handling cars on the road and in the yard which has increased car damage to such an extent that the value of improved gears is somewhat obscured.

The increased weight, length of trains, and heavy motive power, together with the introduction of gravity yards, has undoubtedly influenced the use of the improved draft gears, and those roads using heavy trains of steel cars in the coal and ore trade have found it necessary to adopt friction gears. At the same time the roads using the heavier equipment are being compelled either to replace the draft gear and attachments on the older equipment, or to retire this equipment altogether.

The longer trains and heavier motive power has brought forward certain problems in train handling which as yet have not been entirely solved, and tend to make the requirements on the draft gear more severe. The classification of cars by gravity brought at first a sharp increase in car damage, and a consequent call for improvement in draft gears, but it is felt that, owing to the rapid introduction of steel equipment with the higher capacity draft gears, and also to

the bettering of yard conditions in handling cars, this damage will become less prominent in the future.

No definite figures can be obtained concerning the variation in the cost of maintenance in the draft gear itself comparing the older spring gears with the modern spring and friction types, as the weaker gears, draft attachments and cars themselves are liable to be in more or less wornout condition. It is found that the modern wooden cars with the improved gears are very seldom shopped for draft gear repairs, but a large proportion of bad order cars are of the older type, and the damage can generally be traced to the weakness of the draft gear. The old single power of the engine is easily compressed and then transfers hammer-blows to the car framing, resulting in large renewals of springs and attachments.

Renewals to the friction gear have been due to broken casings, springs and occasionally friction blocks, but this breakage has not been a serious factor with the better class of gears, in fact many gears have been found in good condition and with their capacity unimpaired after five or six years hard service. The breakage of springs is due to heavy loads imposed in a relatively short travel, but even with these springs broken it is found that some friction gears have a capacity equal to that of the twin or tandem spring gears.

The condition of friction draft gears jamming and failing to release is not a general one and has been found in only a few types. The reduction in capacity is due more to broken springs than to wear of the friction surfaces, as it is found in some cases that when the springs are in good shape the old gear has a higher capacity than the new gear, due to the friction surfaces having taken a bearing. The broken casings were found largely in the first gear put on the market and the points of weakness when found were reinforced, so that little difficulty is now experienced in this direction. It is felt that the sticking of gears in compression is due to the combination of insufficient frictional area and too great an angularity in the wedges.

To supplement the data furnished by answers received to circular of inquiry relating to a standard maximum capacity and the desirable resistance during each ⅛-inch compression, static tests were made of new and old gears of types most largely found in service. Twenty-seven gears, furnished by different railroads, representing five types, were tested, and of this number nine were new, the others having been in freight car or locomotive service from a few months up to five or more years.

The committee, while admitting the value of static diagrams in determining certain facts about the distribution of work in friction draft gears, feels that at present it would be inadvisable to recommend a standard maximum capacity or to specify how it should be distributed. Were these values now specified within narrow limits it is evident that at the best not more than two types of gears would satisfy the requirements imposed.

Through the kindness of A. L. Humphrey, general manager of the Westinghouse Air Brake Company, who has devised a method for testing friction draft gears, data of exceeding interest and value have been available. This test consists in dropping a 9,000-pound weight, working between machined guides, a distance varying from six to 24 inches. The draft gear is mounted on a standard follower, supported by standard stops secured to channels by eighteen ½-inch rivets. This test gives a general idea of the relative values of the various spring and friction gears in reducing damage to the car framing, due to improper distribution of compression and excessive recoil. Mr. Humphrey has very generously offered to place this apparatus at the disposal of any members of the association wishing to make draft-gear tests.

The committee has in mind the design of an apparatus embodying something of this principle, but so arranged as to be applicable to a standard car in order that a close approximation to actual service conditions may be obtained in testing the efficiencies of the various friction draft gears in cushioning the shocks to the car framing. It is also believed that in the event of satisfactory results being obtained from these tests that a standard method of testing friction draft gears may be developed for testing gears on a drop test machine, providing that the conditions on the last mentioned apparatus may be so adjusted as to closely approach those found in the service test, and in this event the test could be incorporated in specifications for friction draft gears, which should be framed as soon as sufficient definite information on the subject has been obtained, and your committee will continue to work along these lines.

Coupler Side Clearance.

As a result of the topical discussion at the 1907 convention on coupler side clearance the executive committee referred this matter to this committee. No tests have been made, but the following plan is submitted for the consideration of the association, and it will be carried out during the coming year, if it is approved. A train of steel gondola cars of 41 feet, 11 inches coupled length, equipped with couplers having 5-inch total side clearance, is to be operated on a division having a large number of sharp curves, including some of 13 degrees. By means of iron blocks the side clearance can be adjusted from zero to five inches, and it is proposed to measure the lateral stresses exerted by the coupler on the various curves with a recording pressure registering device placed on the end sill of one of the cars. The draw-bar pull for the different side clearances on the curves can be obtained at the same time with a dynamometer car. In this manner the side pressures exerted by the draw bar and the relation of tonnage hauled to coupler side clearance, will be determined. From these results it will be easy to determine whether or not flange wear is increased by limiting the side clearance.

Through the courtesy of A. S. Vogt, mechanical engineer of the Pennsylvania Railroad, and William Sellers & Co., a drawing of a proposed hydraulic side pressure dynamometer is shown herewith. The principle of this device is as follows: A single annular diaphragm is used, which is clamped between pieces A, D and E, and which is loaded by piece C, which in its turn is attached to piece B. All of these pieces are in the form of rings. The parts are stayed by thin plates F, G and H, which are also in the form of rings. The cell is enclosed in a shell fitted with trunnions, and having radial finger-like projections at each end, which form the abutments. The washers, or followers, I and K, are made with similar projections so as to transmit the load to the support. The liquid is confined between the diaphragm and the recess in A, and this space is connected by means of a small copper pipe to a recording gage of the Bourdon tube type. The attachment to the coupler and car is shown on Sheet 18. The desired side clearance can be adjusted by placing blocks inside the yoke connecting the registering device to the coupler. As the space containing the liquid is very small the travel of the piston and consequent lateral play of the coupler beyond the desired clearance will be practically negligible. The calibrations will be made from an initial pressure to avoid any errors due to lost motion. The question of purchase of this dynamometer at the expense of the association has been referred to the executive committee, and if approved, the committee hopes to furnish some definite data on this subject next year.

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A summary of the recommendations which the committee offers to be submitted to letter ballot, to be adopted either as "Standard" or "Recommended Practice" is as follows:

Standards.

1. That 1¼-inch rivets be used for attaching yokes to coupler butts, and that Sheet M. C. B. 11 be changed to conform to this recommendation, showing 1 5-16-inch rivet holes in coupler butts.

2. That the following be added to third sentence of paragraph 5 of specifications for automatic couplers, "and the rivet holes in the butts must be drilled, or if cored, must be broached out."

3. That all new types of couplers put on the market after January 1, 1909, have a dimension of 9¼ inches from back of coupler horn to inside face of knuckle, and that the face or front wall of coupler have a minimum thickness of 1¼ inches, and that a note to this effect be added to coupler drawings on Sheet M. C. B. 11.

4. That the total lift of the locking pin be not more than 6 inches, and that a note to this effect be added to coupler drawing on Sheet M. C. B. 11.

5. That all couplers must have an eyelet for locking device located immediately above locking-pin hole, so that the recommended links and clevises can be applied, and that a note to this effect be added to coupler drawings on Sheet M. C. B. 11.

6. That the pulling test under specifications for automatic couplers be changed to read as follows: "The couplers must stand a steady pull of 150,000 pounds." "A coupler shall be considered as having failed to stand this test . . . if the knuckle has opened more than ⅝ inch . . . ." "Should either or both couplers fail to stand the prescribed test, but both stand 100,000 pounds, another complete coupler or pair of couplers shall be provided . . . ."

Recommended Practice.

1. That drawing on Sheet M. C. B.—B, showing coupler butts, be omitted, as this will be identical with butts shown on Sheet M. C. B. 11.

2. That drawing of uncoupling attachment on Sheet M. C. B.—B be changed to conform to Sheets 1 and 2 attached, and that Recommended Practice for uncoupling arrangements be also changed so as to conform to this recommendation.

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Bentley, W. F., M. C. B., B. & O., Haddon Hall.
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Bishop, G. C., S. M. P., Long Island, Dennis.
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Boutet, H., Ch. Joint Car Inspector, Cincinnati, O., Chalfonte.
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Brown, Thos. J., Colo. Wyo. Ry., Chalfonte.
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Miller, R. S., G. F. C. D., N. Y. C. & St. L., Shelburne.
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Parker, C. F., Pur. Agt., Ill. Cent., Marlborough-Blenheim.
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Small, J. W., S. M. P., Cananea Yaqui River & Pac., Marlborough-Blenheim.
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Stucki, A., Farmers Bank Bldg., Pittsburg, Windsor.
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Sutherland, T., M. C. B., Grand Trunk, Traymore.
Swanson, Chas. H., M. C. Insp., A. T. & S. F. Ry., Marlborough-Blenheim.
Sweringen, F. H., M. M., Streets Western Stable Car Line, Traymore.
Symington, T. H., Baltimore, Md., Brighton.
Tatum, John J., Supt, Frt. Car Dept., B. & O., Haddon Hall.
Taylor, J. W., Jr., Marlborough-Blenheim.
Taylor, J. W., Sec'y, M. C. B. Assn., Marlborough-Blenheim.
Tewkesbury, E. M., G. S., South Buffalo, Haddon Hall.
Thiele, Chas. F., G. C. I., P. C. C. & St. L., Shelburne.
Thomas, F. H., Supt., Bellefonte Central, Seaside.
Thomas, H. T., M. M., Detroit & Mackinac, Haddon Hall.
Thomas, I. B., M. M., Pennsylvania, Chalfonte.
Thomas, W. H., Philadelphia, Dennis.
Thompson, W. O., M. C. B., N. Y. C. & H. R. R. R., Marlborough-Blenheim.
Thomson, S. G., Asst. to G. M., Pennsylvania, S. Iowa Ave.
Tonge, John, M. M., Mnpls. & St. L., Marlborough-Blenheim.
Trimyer, H. L., G. F. C. D., Seaboard Air Line, Marlborough-Blenheim.
Turner, L. H., S. M. P., Pitts. & L. E., Brighton.
Turney, E. E., G. C. F., C. H. & D., Monticello.
Turner, J. S., New York, Marlborough-Blenheim.
Turner, Amos, M. M., Lehigh Valley, Islesworth.
Underwood, S. S., Chief Draftsman, Grand Trunk Ry., Traymore.
Van Brimer, Geo., Supt., Colo. & Wyo. Ry., Chalfonte.
Van Buren, C. W., D. C. F., Can. Pac., Young's.
Vincent, M. M., A. G. M., National Car Lines, Traymore.
Waitt, A. M., C. E., New York, Young's.
Walsh, J. F., S. M. P., C. & O., Marlborough-Blenheim.
Walsh, F. O., M. M., At. & W. Pt. and W. Ry. of Ala., Marlborough-Blenheim.
Watts, A. H., S. M. P., Cin. Northern, Dennis.
Waughop, Chas., Ch. Joint Car Insp., East St. Louis, Young's.
Weigle, J., Gen. For. Penn. R. R., Ethlyn.
West, Geo. W., S. M. P., N. Y. Ont & Western, Haddon Hall.
Westervelt, Jos., M. C. B., N. Y. C. & H. R., Minneapolis.
Whitbridge, J. C., Buckeye Steel Castings Co., Columbus, O., Brighton.
Whyte, F. M., C. M. E., New York Central Lines, Young's.
Wildin, G. W., M. S., N. Y. N. H. & H., Chalfonte.
Williams, R. H., Car Agent, Fairmount Coal Co., Dennis.
Wilson, R. D., Asst. Chf. Car Inspector, P. & R., Strand.
Worhle, John, Ch. Joint Car Insp., Columbus, O., De Villa.
Yergy, J. P., Insp. Passenger Equipment., Penn., Phila.
Young, C. D., M. E., C. B. & Q., Young's.
Young, C. B., M. E., C. B. & Q., Marlborough-Blenheim.

The Pressed Steel Car Company is showing an all-steel passenger coach on track 4 at electric station adjoining Pennsylvania passenger station.

H. B. Underwood & Co., Philadelphia, Pa., at spaces 316-318, exhibit their standard portable boring bar, rotary valve seat planing machine, a new design crank pin turning and reboring machine, a portable pipe bending machine and a two-cylinder air or steam motor for use with portable tools. A. D. Pedrick is in attendance.

With Exhibitors and Others

The various products of the St. Louis Surfacer & Paint Company are shown in the booth of the U. S. Metal & Manufacturing Company, its eastern agent. The Metal company's exhibition car is also painted with the St. Louis Surfacer paint.

* * *

The Dearborn Drug & Chemical Works, which has an exhibit on the end of the pier, near the meeting hall, shows some interesting specimens of boiler tubes, that are familiar to railroad men who have had operating experience in bad water districts. The methods employed by the Dearborn company in handling bad waters have made it possible to use in locomotives many waters that were not before thought usable, and the company has found but few boiler waters that the careful and systematic use of its scientifically prepared water treatment will not greatly improve, enabling the mechanical departments of railroads to get greater service and life out of the boilers, and boiler tubes, and to effect interesting economics in locomotive operation.

* * *

The Zenoleum disinfecting machine, manufactured by the Zenner Disinfectant Company, Detroit, Mich., is made of brass, handsomely finished in rich old oxidized copper. It has a brass indicator gage at one end of the machine to make clear to the inspector the amount of its contents at all times. This device is especially designed for use in railroad equipment.

* * *

The Hudson Companies are using Mason Karbolith car flooring in large quantities, the floors of 60 cars having been covered recently. They have also used large quantities of carborundum Mason safety tread at the Hoboken Terminals, the Fourteenth, Dey and Hudson street Stations, New York City. The Interborough Rapid Transit Company is installing Mason carborundum safety treads in all of its new stations, and the American Mason Safety Tread Company is seldom without some orders on hand at its factory for this company, and this is equally true of the Rapid Transit Subway Construction Company.

"Eureka" heat-proof enamel is in use on 25 large railroads in the United States. It withstands the heat, is readily applied with a brush and requires no thinner. It is shipped ready for use by The Otley Manufacturing Company, Chicago.

* * *

A pleasing and useful custom which has for many years been followed by the publishers of the Pocket List of Railroad Officials is in evidence this year. This is the provision of an ample supply of that handy volume that anyone may have for the asking. However, this method of circulation is only an incident. What is of especial interest and value to the patrons of the publication is that an agreement of 13 years' standing between the publishers and the railroad companies provides that a copy of each issue be sent to every operating, purchasing, mechanical and engineering official of every railroad on the North American continent, thus giving a certain official character to the work and insuring not only the amount but the character of circulation.

* * *

In the exhibit of The Chicago Railway Equipment Company unusual attention has been paid to securing a harmonious color scheme. The dominating colors are tan and green, and the racks upon which the brake-beams rest are maroon. A collection of palms interspersed with flowers afford a pleasing background and the effect is assisted by the green chairs and rugs of the same color, while touches of color are given here and there by flags of all nations. The exhibit includes Creco, National Hollow, Ninety-six, Sterling worth and Monarch brake beams, Monitor bolsters of various capacities and designs and Creco side bearings, slack adjusters, journal boxes and brake jaws.

* * *

The McConway & Torley Company, of Pittsburgh, Pa., has been giving its railroad friends "See-Saw" puzzles as souvenirs. The "See-Saw" is a fascinating trinket which, it is said, will induce wakefulness if you are sleepy, woo you to slumber if you are wakeful, and also keep one out of mischief in an idle hour. There is a suggestion on the box containing this puzzle that the receiver should not "See-Saw" with orders and indicating a good place to send them.

* * *

The Ritter Folding Door Company of Cincinnati is exhibiting the Ritter folding door for round houses and machine shops and is represented by J. M. Crowe, who reports that the company has just received an order for 80 doors from the Inter-Terminal Railway of Cincinnati to be installed in the freight station at Cincinnati.

* * *

Booth 477 contains the first convention exhibit of the Uwanta Wrench Company. G. P. Bain is in attendance to vouch for the superior qualities of this drop-forged product.

* * *

The Adams & Westlake Company is showing a new design of light-weight dynamo with its Adlake-Newbold axle lighting equipment. The weight has been reduced from 960 pounds in the older type to 700 pounds in the present design without lessening the capacity. The remainder of the exhibit includes the specialties shown in former years, comprising car interior lighting fixtures, Adlake acetylene lighting system, signal lamps and lanterns and car hardware and trimmings.

* * *

The Cleveland Car Specialty Company and the Butler Drawbar Attachment Company are exhibiting pressed steel specialties, also friction and spring draft gear. A line of steel pressings used in all steel passenger coach construction on the Pennsylvania Lines is shown.

* * *

The Flannery Bolt Company is represented by B. E. D. Stafford, manager; Harry Pyke, eastern representative; T. R. Davis, mechanical expert, and J. R. Flannery, sales manager, Mr. Flannery is enroute from Pittsburg in an automobile.

* * *

The Carborundum Company, Niagara Falls, will be represented by G. R. Rayner, secretary, Chas. Nicholson, W. W. Sanderson, Robt. Fuller and Mr. Shoemaker.

* * *

The Consolidated Car-Heating Company is exhibiting this year its vapor system which, with the by-pass feature, adapts itself to use as a direct steam system when desired. The company also shows steam couplers of various types and sizes, locomotive heating equipments and various train pipe and valves, hose nipples and clamps, pressure reducing valves, etc. The working of the vapor system and also the special locking feature on the couplers, is explained at the company's booth.

* * *

The forged steel fulcrum has become a permanent feature in brake beam construction, and the Buffalo Brake Beam Company, which owns the original patents on this, has entirely discarded the malleable iron fulcrum in the manufacture of its brake beams.

* * *

A novel locomotive valve gear, which has no links, is the exhibit of the Pilliod Company in space 401. A model one-quarter size shows the operation of the gear, which is outside-connected. So confident is the maker of this gear of

its performance that they guarantee a reduction in steam consumption of five per cent and a saving in maintenance of 50 per cent over the Stephenson gear. The company will put it on any locomotive and if it proves unsatisfactory will take it off without expense to the railroad.

* * *

Young's Million Dollar Pier is an exhibition of the use of Dixon's paints.

* * *

The Lancaster oval taper drill sockets and oval taper shank drills are receiving much attention from delegates who are interested in a solution of the drill driving problem.

* * *

John G. Platt, the mechanical representative of the Hunt-Spiller Manufacturing Corporation is for the second time present as a supply man. Mr. Platt became connected with this corporation just a year ago and has been particularly successful and making a host of friends for the concern.

* * *

Two of the Excel couplers exhibited by the Scullin-Gallagher Iron & Steel Co. have been in continuous service on heavy freight locomotives; one from May 15, 1907, until its removal and shipment to Atlantic City, May 23, 1908, making a total of 33,502 miles. This coupler is one of the type exhibited last year, and has a fine record.

* * *

Gold's new No. 701 and No. 800 couplers for steam hose are included in the exhibit of the Gold Car Heating & Lighting Company.

* * *

The National Lock Washer Company, Newark, N. J., has a large exhibit of car window sash locks and fittings, curtains and fixtures, Nut Locks, etc., which will interest delegates.

* * *

The Maryland Railway & Electric Supply Company, of Baltimore, is the exclusive eastern sales agent for Thompson indestructible hose clamps, which are made of galvanized cold rolled steel in all standard sizes or furnished to order. The advantages claimed for these are that they are easily applied, readily removed without distortion, grip the hose firmly, amply strong, and cheap.

* * *

The Lancaster Machine & Knife Works says that it offers every shop the opportunity of reclaiming its scrap heap, not temporarily but for all time, by adopting the Oval Taper Drive, tool room expense being reduced to the minimum and the output on drill presses being increased 25 to 50 per cent.

* * *

In connection with the grinding of car wheels it has been discovered that wheels ground on the Norton machine do not become flat afterward, but continue to wear perfectly round so that at this time it is thought by certain railroad men that the fact of these machines making the wheels perfectly round prevents flat spots occurring in the wheels afterwards. This has been the contention of the Norton Grinding Company from the first.

* * *

The accompanying illustrations show a comparison of the Farlow draft gear coupler fastening with the old style riveted yoke. Plate 1 shows the Farlow key coupler fastening. This key is 1⅛ inches x 5 inches and affords an area of 5.625 square inches on single shear, and on a double shear 11.75 square inches. This coupler fastening appears to be very strong. In case of a broken coupler replacement can easily be made, without shop labor, by simply removing the key as shown. The M. C. B. standard slotted coupler is used, therefore no new extras are necessary.

Plate 2 shows the M. C. B. fastening with rivets 1¼ inches in diameter. These two rivets afford an area of 2.454 square inches on a single shear, and on double shear 4,908 square inches. In case of a broken coupler replacement requires cutting out the two rivets, necessitating, of course, shop labor.

One railroad found that out of 90 break-in-twos 70 per cent were caused by rivets shearing at yoke or breaking. It is impossible for such an occurrence where the Farlow is used.

There are now about 85 railroads and private car lines in the United States using the Farlow draft gear attachment extensively, and from the fact that it is practically indestructible, repairs have been reduced to a minimum.

* * *

The General Compressed Air & Vacuum Machinery Company of St. Louis is showing a complete line of pneumatic railroad car cleaning equipments, including its No. 1 wagon truck with tool box, automatic control valve for preventing waste of power, etc. This No. 1 truck has a two-man capacity and is designed for use in the yards which are usually piped for compressed air. The No. 2 and No. 3 trucks are also on exhibition and these three trucks will be shown in operation, cleaning a car seat, rugs, carpets, etc. A complete set of renovators and cleaning tools are also shown, and the company is distributing some very attractive advertising literature. The Indiana Union Traction Company, the International & Great Northern and a number of other railroad and traction companies are using these compressed air vacuum car cleaners with satisfaction and economy. The General Compressed Air & Vacuum Machinery Company also makes a complete line of plants for cleaning residences, hotels and office buildings, and has over 400 operators of its portable house cleaning machines in the United States alone. The president of the company, John S. Thurman, is an old railroad man, as is also Reuben C. Hallett, the manager of the railroad department. Mr. Hallett is in charge of the company's exhibit at space 322.

* * *

One of the features of the National Tube Company's exhibit in booths 400 and 402 which attracts considerable notice is the chime of seamless formed steel bells. These are connected with a piano keyboard by electricity and selections can be rendered. It is announced that two daily concerts will be given—one at 10:30 a.m. and one at 4 p.m. The repertoire will include popular airs, opera selections, etc.

* * *

The Wells Light Manufacturing Company is placing on the market a file handle, which it claims is absolutely unbreakable. The handle is made of malleable iron and is naturally heavier than the old wooden handle, but it is none the worse for that. It gives better balance to the file, allowing more pressure to be brought to bear without fear of it splitting at the most critical moment as the old handle often did. This handle has been tried out in England where it has met with success, and this fact in itself should be sufficient guarantee of the stability of the article.

* * *

The Strang gasoline electric motor car "Irene" came down from Jersey City over the Central Railroad tracks by way of Winslow Junction last evening. The average running time was 46 miles an hour on the Philadelphia & Reading tracks from Winslow Junction to Atlantic City; maximum speed attained between Jersey City and Winslow Junction, 56 miles. The car is to be located at stand 15 on Mississippi avenue near the Boardwalk. It is expected to make several demonstration runs during the conventions as may be arranged through J. K. Duffy, vice-president, or L. G. Nilson, chief engineer, at the Traymore. W. B. Strang, the president, is looked for this evening or early tomorrow morning.

* * *

The screw spikes which have been placed on the market recently, and which are being adopted by elevated and street railways, created the necessity for a portable tool to facilitate their application. The Chicago Pneumatic Tool Company is exhibiting one of its 1M3-19 500-volt electric drills, adapted

especially to this class of work. Twenty-two of these drills are in operation on the reconstruction of the Chicago City Railway, and it is reported that one drill is accomplishing more work than eight men were able to do by the old hand method. There is no question but what the screw spike is destined to become widely adopted by electric and steam railways ere long, and this part of the exhibit ought to prove of value to all in attendance who have anything to do with the maintenance of track or track construction.

* * *

Richard Dudgeon, manufacturer of hydraulic jacks, has no exhibit but is ably represented by James W. Nelson, manager. Mr. Nelson will spend the next few weeks after the convention in a trip to the Pacific coast.

* * *

The Falls Hollow Staybolt Company recently shipped a large tonnage of Hollow staybolt iron to the Great Southern of Spain Railway.

* * *

The Cleveland Car Specialty Company exhibits at space 55 a variety of pressed steel carlines for freight cars and pressed steel posts and carlines for electric cars and steel passenger coaches.

* * *

The New Era journal box and lid are exhibited by Sinclair J. Johnson of No. 10 Wall Street, New York. In this design the lid and spring are in grooves in the extended sides of the box in which they slide to open or close the box. A cam on these grooves causes the spring to press hard against the lid when closed, holding it firmly locked; but in other positions they slide easily till they strike the projections at bottom of grooves stopping the lid when it is fully open. There is no machine work required, and no planing of box or lid make them tight, as the dust is excluded by two tightly fitting working joints and one spring pressed joint on all edges of the lid, and water cannot get in the box by gravity or be driven in by storm. The advantages claimed for the design are that it is composed of but one piece held in place by a straight leaf spring; there are no bolts, nuts, cotters or springs that wear loose and become inoperative; the lid does not wear loose as it has full bearing on all edges and the spring holds it firmly in place when closed; the lid is not exposed, either when closed or open, so as to be struck by passing objects and cannot be torn off or opened when forcing the train through heavy snow drifts in the winter; the lid when in the open position does not obstruct the opening of the box, nor is it in position liable to be damaged.

* * *

The Amberg Car Truck Company, Chicago, exhibits, at space 471, its articulated side frame for freight trucks. The frame is made in halves with the springs disposed, almost horizontally. There is no spring plank and the connection between the bolster and side frame is made by means of helical springs which are compressed by a toggle action, at the same time rendering the frame flexible. The design is to avoid the rigidity of the ordinary stiff bolster springs and solid side frame. The central column bolts are dispensed with and fewer bolts and rivets are used than in the usual truck construction.

* * *

The exhibitors of pneumatic tools and appliances operated by compressed air are being furnished with the necessary air for demonstrating purposes by a Class G compound belt Franklin air compressor of 419 foot capacity, which has been installed by the Chicago Pneumatic Tool Company. This machine is located near the entrance to the pier and should be examined by all mechanics in attendance.

* * *

The damage to the Jos. T. Ryerson & Son exhibit, en route from Chicago, as noted in yesterday's Daily, was not as serious as first reports indicated. Although the car containing the exhibit rolled down a 40-foot embankment, the machine tools were well crated and packed, and no great damage resulted. The exhibit is now installed in Machinery Hall, although in consequence of the accident in transit the Ryerson friction saw, the crank pin truing machine and valve seat facing machine are not yet in operation.

* * *

The Yale & Towne Manufacturing Company is exhibiting at space No. 215 a new electric Triplex hoist, overhead trolleys, chain blocks, Blount door checks for coach doors, station hardware and an enlarged operating model of the Yale cylinder showing the application of the paracentric key and the pin tumbler mechanism. The company is represented by W. C. Bigelow, of the Blount check department, and C. W. Beaver, of the electric hoist department.

* * *

If you enjoy a visit to Fairyland, visit the exhibit of the Joseph Dixon Crucible Company, Jersey City, N. J., situated close by the ocean and fully exposed to view. The well-known structural steel building, painted with Dixon's Silica-Graphite paint has been made most inviting and popular by giving it the appearance of a beautiful summer house. The green laurel, climbing the sides and overhanging the roof, is intertwined with electric bulbs, producing a pleasing effect, while beneath the star spangled roof, the rippling of fountains surrounded with plants of various kinds, tells the spectator of the enterprise of the interest manifested by the Joseph Dixon Crucible Company, in making convention exhibits a success. Colored lights display the words "1827 DIXON 1908."

CLARK MECHANICAL BOILER CLEANERS.

A. C. Clark & Co., Grand Crossing, Ill., exhibit at booth 35-37 a full size model of a locomotive firebox and the fixtures for Clark's mechanical boiler cleaner which has been used with remarkable success on 1,000 locomotives in foreign countries and is now being introduced in the United States. The principle of the device is based on the periodic removal by mechanical means of the solid particles suspended in the water before they can combine to form a hard deposit. It is thus intended to supersede to a large extent water softeners and scale dissolvents. The mechanical operation is a combination of skimmers with surface cocks in the front of the barrel of the boiler and skimmers in the lower part of the firebox water leg in connection with blow-off cocks. One draw-off head for the skimmer is located between the boiler tubes and the dry pipe extending the whole width of the shell at that point and a deflector head or scoop is provided to collect the forward moving solids and direct them to the trough. The draw-off head consists of a gun metal casting having ports or suckers in its under side. These ports are spaced with a gradually diminishing pitch from the center outwards so as to equalize the action throughout the whole length of the head. The operation of this part of the apparatus is controlled by the scum or surface cock located in the cab and connected by a pipe to the draw-off head. The firebox fixture is similar in construction to the draw-off head in the front end and encircles the water legs in two sections, each taking care of one side and half of each end. There are two blow-off cocks at the front end of firebox, which connect with the two sections of draw-off heads. The main tube of the head is only 1½ inches in diameter outside and the ports are nearly the width of the water space. The scum cock is used just before and after leaving the roundhouse and once or twice during the trip for half a minute on each occasion. The blow-off cocks are used only at the end of trip and preferably when over the ash pit and only for a half minute. The important results obtained by the use of the Clark mechanical boiler cleaner are such that the mileage of the engine between washouts is very largely increased. It thus saves the necessity of frequent cooling down and washing out which is so destructive to the tube joints. The cost of washing is largely reduced and the engine is available for a much greater mileage.

WOOD'S NIPPLE END HOSE PROTECTOR.

The device illustrated is for protecting air brake hose from outside chafing and abrasion. Being flexible it does not make a rigid covering at the nipple end. It can be ap-

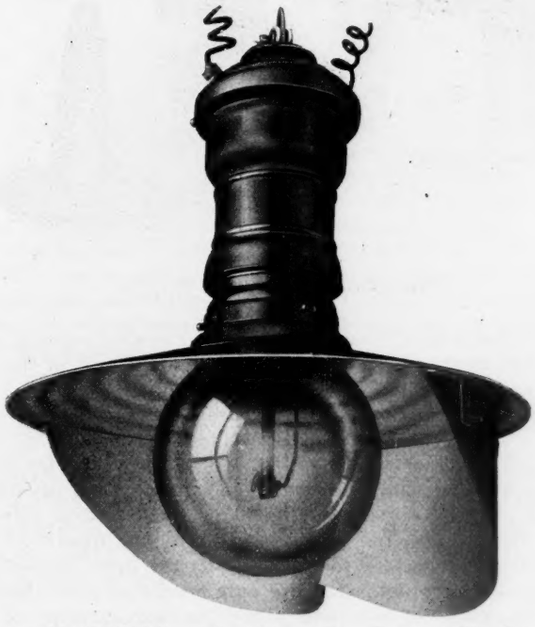
Wood's Nipple End Hose Protector.

plied to any make of hose and taken from old hose and applied to new; it will not wear out, and, it is claimed, will save railroads at least 25 per cent on air brake hose.

RAILROAD YARD LIGHTING WITH LUMINOUS ARC LAMPS.

The proper lighting of railroad yards is more or less a difficult problem, and especially is this true of classification yards. The efficient working of the entire yard system depends on the dispatch with which cars are switched over the hump and shunted off on to the proper tracks. The momentum required to start the cars must be imparted by the grade of the track, and if the speed of the car is checked by the brakeman because he is unable to gage the exact position of the car ahead, the capacity of the entire yard is affected.

Electric lights as ordinarily used are not effective on



Railroad Yard Lighting—Luminous Arc Lamp with Special Reflector.

account of the small number used and the ineffective placing, the brakemen often supplementing these by placing lanterns to indicate exactly the position of the last car. In order to obtain the best results it is desirable that the light should be thrown lengthwise of the yard in the direction of the train movement. This secures effective illumination of the train ends and also avoids car shadows.

The General Electric Company has developed a special type of reflector which, when used with luminous arc lamps in multiple on 110-volt direct current circuits, is designed to afford effective and efficient illumination of all parts of the yard. The peculiar advantage of the luminous arc and one which fits it for this class of work, is its property of distributing the strong light just below the horizontal.

The accompanying illustrations show the general appearance of a luminous arc lamp equipped with an inverted concentric reflector with a screening vane attachment which throws the light forward and downward. The object of this

Railroad Yard Lighting—Luminous Arc Lamp with Special Reflector.

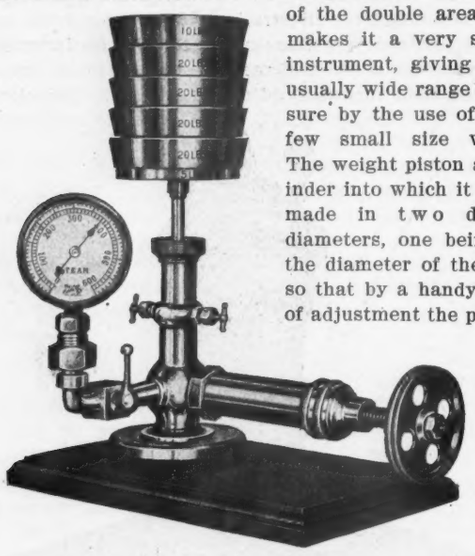
side vane is two-fold; it prevents the direct rays of light from being thrown into the brakeman's eyes, and it strengthens the light on the train end. This reflector, which is made of steel with an extra heavy coating of enamel, can also be made with enclosed arc lamps, having a single globe or closed base globe casings. A smaller reflector of similar design can also be placed inside of the globe on series luminous arc lamps.

As regards the arrangements of these lamps with reflectors in order to secure the best results a sufficient number of lamps is placed at proper intervals from the hump to the ladder end on poles or steel bridging, the height being sufficient to avoid casting serious shadows from one car to another. With yards over 100 to 150 feet wide it is desirable to leave space for a row of lamps through the middle of the yard.

The Lovell window operator is designed to assure an equal opening and closing of windows along a line of sash 500 feet in length quite as well as a run of 100 feet or less. The importance of this fact can be readily appreciated by all those having window operating devices in charge. A few points for control of the windows makes possible quick action in case of fire or storms. This device is especially adapted for railroad shops, and is extensively used by some of the large railroads. The G. Drouve Company, Bridgeport, Conn., is the manufacturer, and has an exhibit at space No. 471 on the pier.

ASHTON GAGE TESTER.

The device illustrated herewith is manufactured by the Ashton Valve Company, 271 Franklin street, Boston, and is known as the Ashton improved gage tester. It is an instrument for accurately testing and correcting pressure gages by means of weights. As a standard for measuring pressures it is equal in accuracy to a mercury column, yet much more convenient and less expensive. The patented improvement of the double area piston makes it a very superior instrument, giving an unusually wide range of pressure by the use of only a few small size weights. The weight piston and cylinder into which it fits are made in two different diameters, one being half the diameter of the other, so that by a handy means of adjustment the pressure



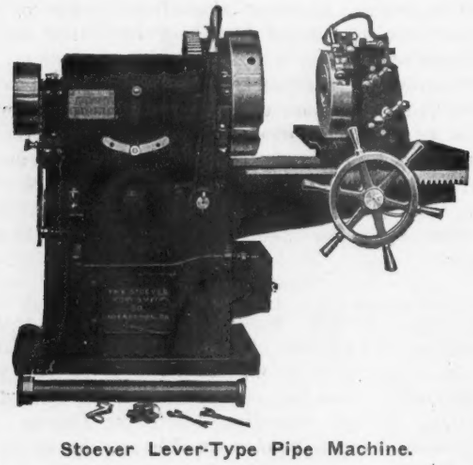
Ashton Gage Tester.

may be exerted either on the large or small area of the piston, the latter giving four times the pressure of the former without any change of weights.

The tester complete has weights for testing to 1,000 pounds, and is furnished with screw driver, hand puller, hand set, oil can, and six nipples for attaching gages, all packed in two separate cases provided with substantial handles, so as to be easily carried.

STOEVER LEVER-TYPE PIPE MACHINE.

The accompanying engraving illustrates the lever-type machine for cutting off and threading pipe as built by the Stoever Foundry & Manufacturing Company, of Lebanon, Pa., and recommended as especially well adapted for railroad



Stoever Lever-Type Pipe Machine.

work. The illustration shows the No. 2 machine, which is arranged to handle pipe from one-quarter inch to two inches in size. All sizes of these machines have a single pulley drive with a large number of speed changes in the gearing, a speed plate being furnished with the machine to show just how the speeds are obtained, and for what sizes of pipe they properly may be used. The bed and headstock are in one casting, giving unusual rigidity to all of the bearings, which is particularly necessary in this type of machine. The gearing is completely enclosed, but can be opened up for inspection very readily.

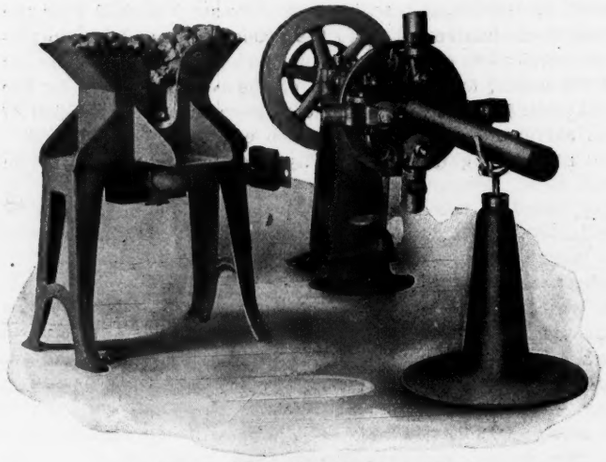
The gripping chuck is of an improved design, and is completely enclosed, presenting a smooth surface. There are three jaws operated by the hand lever, which may be universally adjusted at any one of three points in the rim of the chuck. The die head is of the sliding type, with inserted steel cams and plates to reduce wear. A novel form of stand is used, which holds the steadying slides and cutting off tools, one particular feature of which is that the cutting off tools can be brought up very close to the chuck; a piece of pipe can be cut off two inches from the face of the chuck.

Three sizes of machines are made : No. 2 for ¼ to 2-inch; No. 3 for ¼ to 3-inch; No. 4 for 1 to 4-inch pipes.

The Stoever company has an exhibit at Space 156, Machinery Hall, where one of these machines is in operation.

RYERSON FLUE WELDING MACHINE.

The machine illustrated herewith was designed by Joseph T. Ryerson & Son after a careful study of the various types of flue welders and of the ideas of leading railroad mechanical officers. It has a heavy base on which a revolving shaft is mounted in suitable bearings. This shaft carries the driving pulley and flywheel at one end, while at the other end and



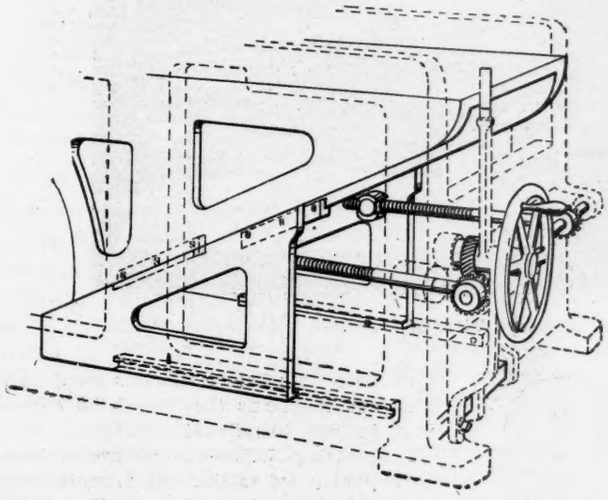
Ryerson Flue Welding Machine.

continuous with it is an internal roller carrying mandrel, this mandrel much resembles the ordinary roller type of flue expander and it is designed to roll the inside of the tube during the welding process. These mandrels are made in all sizes and are interchangeable by screwing the threaded end into the end of the driving shaft. A steel head with arms carrying large adjustable rollers revolves with the shaft, the rollers being disposed equidistant and in the same vertical plane as the mandrel rollers. By pressing the foot treadle of the machine the outside rollers are brought down toward the mandrel rollers until they are only separated from them by the thickness of the tube wall. The arrangement of the four rollers is such that they can be accurately and quickly adjusted by anyone and as this is the only adjustment necessary this machine is very easy to operate.

The following advantages are claimed for this machine: (1) It is driven entirely from the pulley (or gear if motor drive is used) no air or steam is necessary to exert the pressure at the welding point. This does away with all connections, leaks, etc., as well as the expense attendant upon

the operation of pneumatic machines. It further to a considerable extent makes the machine portable. (2) This machine is the only machine which rolls the lap of the weld on the inside. Rollers are set in the mandrel and so arranged that the outside rollers are carried at the same time and at the same speed. Rolling the tube from the inside and outside while welding is a new departure, and one that absolutely ensures a smooth weld, true to gauge and one that is virtually invisible.

Great stress is laid on the simple and accurate adjustment of the rollers. To set this machine the cold tube is placed upon the mandrel and the arms of the machine are brought down and adjusted to the thickness of the cold tube, this requires no skill whatever, and can be accomplished in less than five minutes, and the adjustment can be made to within a hundredth of an inch. The mechanism is positive and wnen once set every tube welded will be the same size. The rolls cannot be brought closer together by the foot lever than the point at which they are adjustable and locked. All fast running parts are arranged so that the slightest wear an



Fay & Egan Cabinet Smoothing Planer—Incline Wedges, Figure 2.

be taken up. Strong claims for rapid and good work are made and the manufacturers will furnish machines for trial purposes to responsible parties without cost or obligation.

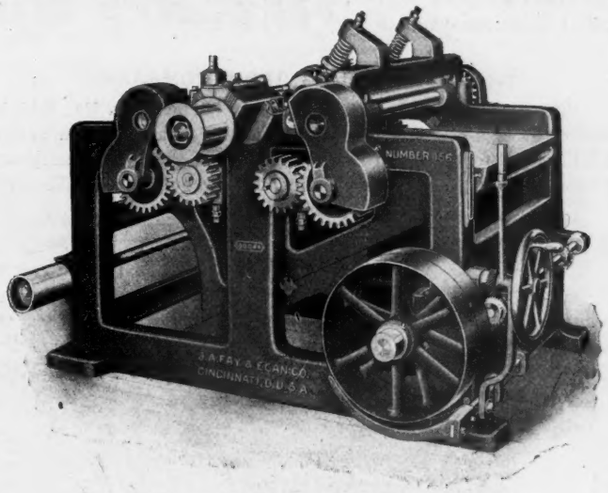
This machine in addition to welding will scarf, spread or cut off tubes as desired. This is done by removing the roll mandrel and substituting the proper scarfing rolls, spreading device or cutting wheels. Such a change can be made in very few minutes.

While welding with this machine both hands are free to handle the tubes. A pair of small light special tongs is furnished with the machine; these are used in one hand to prevent the tube from turning around while being welded. A suitable stand is also furnished with each machine; this is provided with an adjustable fork and spool roller and can be located in front of the machine to hold up the tube at one end while the other is being welded. The shipping weight complete is 1200 pounds.

FAY & EGAN CABINET SMOOTHING PLANER.

One of the accompanying engravings shows the No. 156 cabinet smoothing planer manufactured by the J. A. Fay & Egan Company, Nos. 155-175 W. Front street, Cincinnati, O., and the line drawings contrast the inclines as built for this machine with the ordinary construction. The ordinary method of arranging the incline wedges is shown in Figure 1, the base of the triangular wedge resting loosely on the extended base of the machine, and the bed resting on the hypotenuse of the wedge without any additional support.

In the machine shown the arrangement (as illustrated in Figure 2) is to have adjustable gibbs both at the bases of the

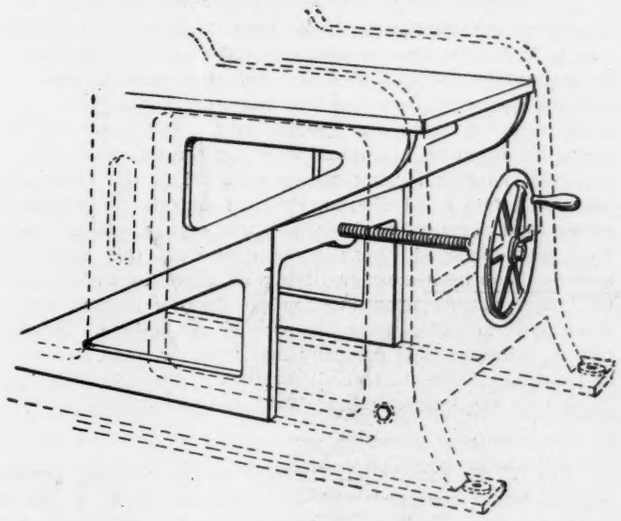


Fay & Egan Cabinet Smoothing Planer.

triangular wedges and at their inclined surfaces. This secures greater firmness in the bed and prevents the wedges pulling away from it when setting the machine for planing to dimensions.

Operating the inclines by a single screw controlled by a hand wheel in the center at the feeding-in end of the machine has bad features which appear after the machine has been used for a while and the surfaces of the inclines have been worn unevenly as they inevitably must. In such case the surface of the bed will not be parallel with the cutting edge of the knives, one side being lower than the other, and hence it is impossible to plane a straight surface.

The adjustment of wedges on this machine is by parallel screws (mounted on ball bearings so as to turn easily) and operated by bevel gearing, pulling both wedges in exactly the same plane, as shown in Figure 2. These gears are arranged



Fay & Egan Cabinet Smoothing Planer—Incline Wedges, Figure 1.

so as to be moved in or out independently so as to constantly keep the inclined surfaces of the wedges in the same plane no matter how unevenly the wear on them may be. This arrangement insures that the surface of the bed will rest parallel with

the cutting edge of the knives and give a straight surface to the stock at all times.

With this method of raising and lowering the bed a board the full width of the machine can be planed to the same thickness on both edges and throughout its entire surface, which is so essential to very fine surfacing.

THE PARKESBURG IRON COMPANY.

The Parkesburg Iron Company, of Parkesburg, Pa., which has been engaged in the manufacture of charcoal iron skelp exclusively for 42 years, having now a yearly capacity of 20,000 tons of high grade product, is now building a tube mill which it is expected will be in operation by October next. It is the belief of the company that charcoal iron is the best material for boiler tubes, and it is arranging to roll its skelp into tubes, exercising in the tube mill the same care that has contributed to the high standard of the skelp made by it.

The Parkesburg Iron Company—Birdseye View of Plant.

DAMASCUS FORGED BRAKE FULCRUMS.

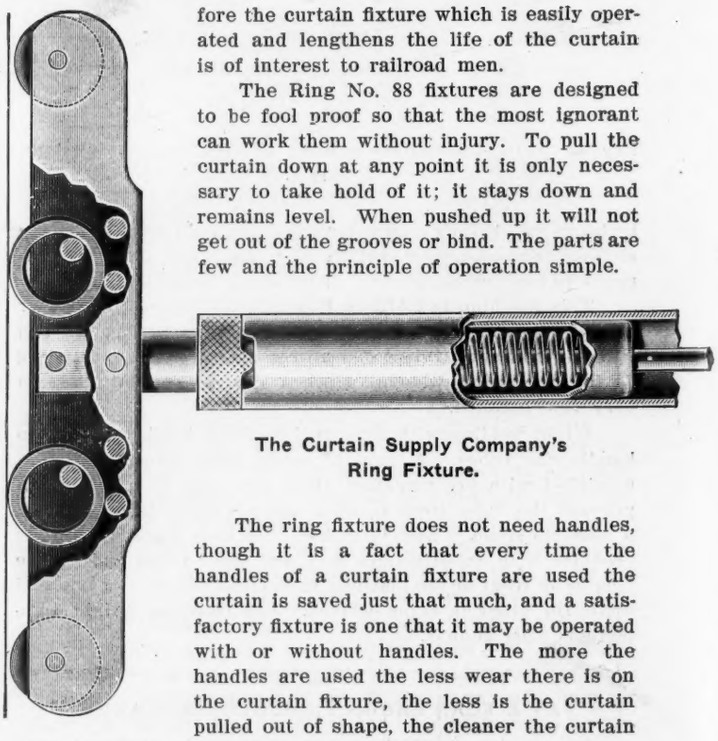
When the Damascus Brake Beam Company first developed a forged fulcrum considerable difficulty was experienced in maintaining perfect dies and securing uniform material and workmanship from the few forging manufacturers who were equipped to do this special work. For these reasons specially designed machines were purchased, and one of the most modern forging plants installed at the Damascus company's factory at Sharon, Pa. All material is purchased under rigid chemical analysis and only expert machine operators are employed. Results obtained from this important addition have been most gratifying, as guarantees of delivery no longer depend upon independent forging makers and a more uniform and satisfactory product is obtained. In addition to fulcrums, this company makes rivets, pins, eye bolts and machine bolts—in fact all forgings required in manufacturing both the Damascus and Waycott types of beams.

The T. H. Symington Company has on exhibit several journal boxes equipped with its improved M. C. B. lid of malleable iron. This lid has been recently designed as a substitute for the ordinary pressed steel lid at a very slight increase in cost. Having a drilled lid-bolt hole, a lid-bolt riveted fast to the lid, and the lid hood fitted closely to the hinge lug on the box, is presented as being superior to the ordinary commercial pressed steel M. C. B. type of lid in common use. The journal boxes equipped with this type of lid are samples of the quality and finish of their malleable iron.

THE CURTAIN SUPPLY COMPANY'S RING FIXTURE.

Maintenance costs are most important to railroad men, and while the original cost of an article must be reasonable, the maintenance charges are being especially watched at the present time. The Ring No. 88 curtain fixture is presented by the Curtain Supply Company as meeting these two conditions. The positive holding of the rings which are thrown into engagement with the bottoms of the grooves by the upward pull of the roller prevents the fixture from creeping up, and the rocking away of the rings as the curtain is pulled down keeps the fixture level and within the grooves. A curtain is an essential part of the modern car and therefore the curtain fixture which is easily operated and lengthens the life of the curtain is of interest to railroad men.

The Ring No. 88 fixtures are designed to be fool proof so that the most ignorant can work them without injury. To pull the curtain down at any point it is only necessary to take hold of it; it stays down and remains level. When pushed up it will not get out of the grooves or bind. The parts are few and the principle of operation simple.



The Curtain Supply Company's Ring Fixture.

The ring fixture does not need handles, though it is a fact that every time the handles of a curtain fixture are used the curtain is saved just that much, and a satisfactory fixture is one that it may be operated with or without handles. The more the handles are used the less wear there is on the curtain fixture, the less is the curtain pulled out of shape, the cleaner the curtain is kept and the longer does the curtain last.

To illustrate the value of mica as a material for lamp chimneys, the Storrs Mica Company, has as a souvenir a mica chimney of homeopathic size. With the chimney goes a gas mantle and a little burner as well, which will appeal to anyone who burns gas.